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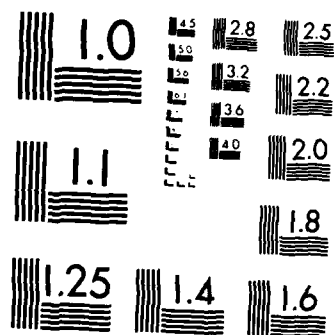
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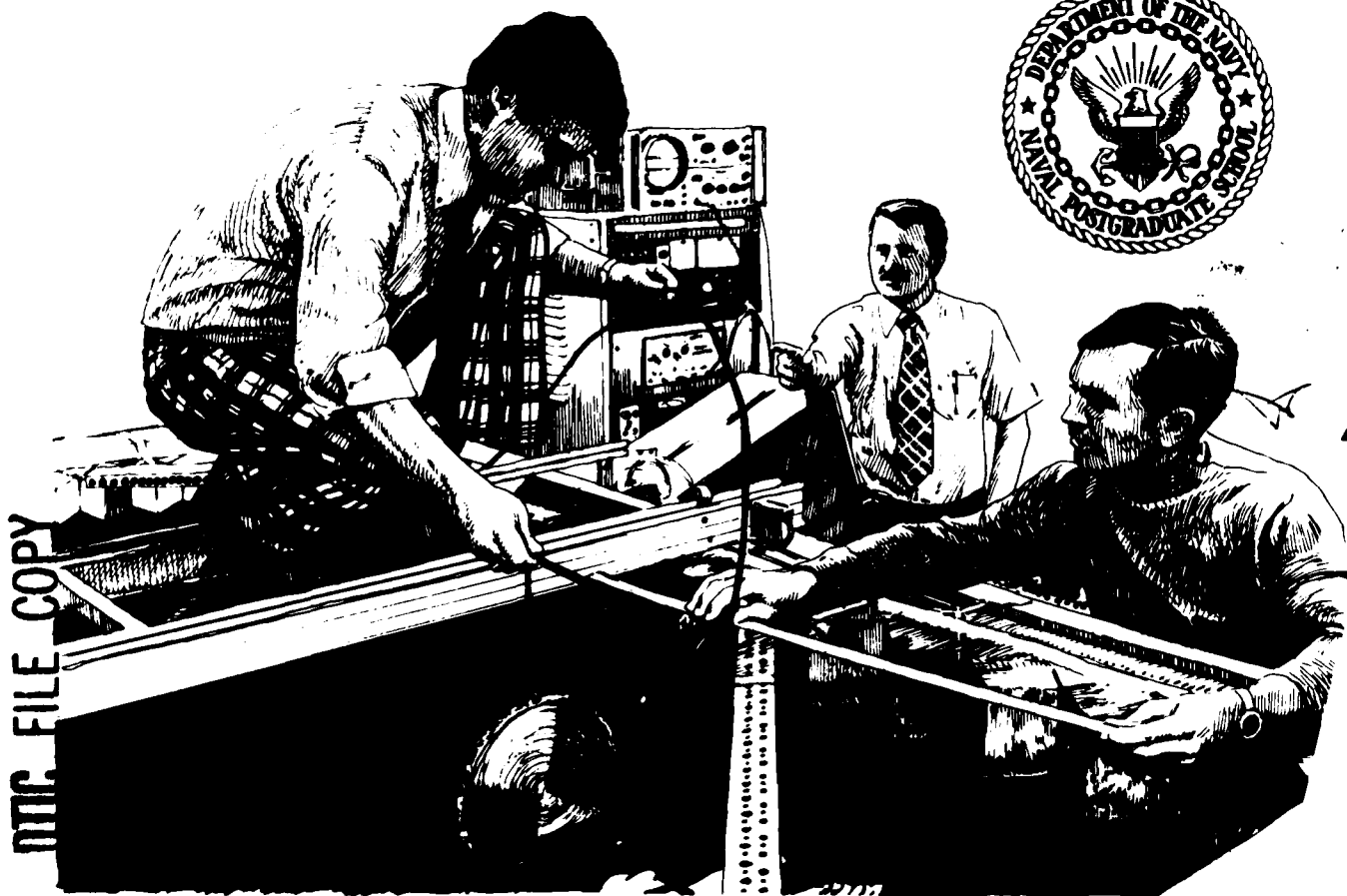
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REPORT FOR THE PERIOD  
1 OCT 1982 TO 30 SEPT 1983

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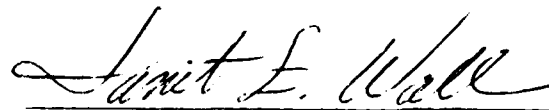
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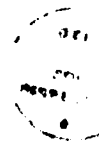
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DESIGN AND TESTING OF SCALED EJECTOR-DIFFUSERS FOR  
JET ENGINE TEST FACILITY APPLICATIONS

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Commander, United States Navy  
B.S., United States Naval Academy, 1969

Design, fabrication and cold flow testing of a modeled jet engine test facility was conducted in an effort to provide an inexpensive vehicle to study geometric variations in diffuser geometry which could improve system efficiency. The design is based on Mach number similitude and consists of two configurations currently in use at the Naval Air Propulsion Center, Trenton, New Jersey. A constant area diffuser and a variable area diffuser with translating centerbody were modeled. Baseline mapping of the operating characteristics for each diffuser with representative scaled engines was conducted to provide a reference against which alternative geometries would be evaluated. The constant area plus two variants were tested. A five-sixths and two-thirds reduction were studied to investigate the potential for increasing efficiency for a specific engine diffuser combination at NAPC. Secondary flow provisions were incorporated into the design to allow variation of this parameter. The modeling results were consistent with theory and the test apparatus produced repeatable results. A two dimensional double ramp (wedge) capable of being translated in a rectangular duct was suggested as an alternative diffuser geometry.

Mechanical Engineer's Degree and  
Master of Science in  
Mechanical Engineering  
September 1983

Advisor: P. F. Pucci  
Department of  
Mechanical Engineering

# **MECHANICAL ENGINEER**



## AN EFFECT OF TURBULENT DIFFUSION ON THE GLOW DISCHARGE-TO-ARC TRANSITION

Richard J. Wallace  
Lieutenant, United States Navy  
B.A., Hamilton College, 1975

In this thesis, an effect of turbulent gas flow on the glow discharge-to-arc transition is investigated. This is accomplished by solving the continuity equation for charged particles by two different numerical processes. They are a linearized solution and a non-linear numerical solution. The numerical results using an axi-symmetric cylindrical geometry show the charge particle density profile with respect to radial distance, time and diffusion coefficient.

In nitrogen at a time equal to  $4\tau_r$ , the radius of the streamer in near turbulent conditions ( $\beta=50$ ) was found to be 2.5 times larger than in laminar conditions ( $\beta=10^4$ ).  $\tau_r$  is the characteristic recombination time and  $\beta$  is the ratio of characteristic diffusion time divided by  $\tau_r$ .

The effective increase in the diffusion coefficient between laminar and turbulent gas flow causes the charge density profile to expand more radially outward. This reduces the charge density within the original streamer volume tube causing a reduction in the conductivity of the streamer. This reduction in conductivity may possibly lead to a delay in the development of a breakdown streamer. As a result, the gas may be raised to higher current levels before breakdown occurs.

Aeronautical Engineer's Degree and  
Master of Science in  
Aeronautical Engineering  
March 1973

Advisor: O. Biblarz  
Department of  
Aeronautics

AN EXPERIMENTAL INVESTIGATION OF SOOT BEHAVIOR  
IN A GAS TURBINE COMBUSTOR

Andrew Clarence Krug  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1974  
M.S., Naval Postgraduate School, 1983

A full scale gas turbine combustor test facility was designed, constructed, and initially operated to determine the performance of a gas turbine combustor and the associated combustion diagnostic apparatus.

The test cell was put through an initial series of four tests. The combustor was operated at 75% of normal operating conditions. A water cooled extractive probe sampling system was used to obtain a particulate sample and an optical system was used to measure the transmissivity inside the combustor and at the exhaust. The opacity of the exhaust gases was also monitored.

The initial test series verified the adequacy of the test cell control apparatus as well as the extractive probe sampling systems. The optical technique employed appeared to be adequate for the purpose of determining the mean particle diameter, but lacked sensitivity for use at the engine exhaust. Recommendations were made for facility and equipment improvements.

Aeronautical Engineer's Degree  
June 1983

Advisor: D. W. Netzer  
Department of  
Aeronautics

THE USE OF A MICROCOMPUTER SYSTEM AS AN AID TO CLASSICAL AND  
DIGITAL CONTROL SYSTEM DESIGN AND ANALYSIS

John Douglas Humphrey  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976  
M.S., Naval Postgraduate School, 1983

This thesis takes five FORTRAN IV programs from "Computer Programs for Computational Assistance in the Study of Linear Control Theory" by Melsa and Jones and translates them into a microcomputer BASIC language to run on an inexpensive microcomputer system. Three of the five programs are state variable programs. They are BASMAT for basic matrix manipulation, RTRESP for rational time response, and GTRESP for graphical time response. Two are transfer function programs, FRESP for frequency response and RTLOC for root locus. A user's guide and example are included for each.

A final example is used to demonstrate the utility of the two transfer function programs as an aid to direct digital design in the  $w'$ -plane.

Aeronautical Engineer's Degree  
June 1983

Advisor: M. D. Hewett  
Department of  
Aeronautics

EXPERIMENTAL DETERMINATION OF THE RELATIVE FLOW AT THE  
TIP OF A TRANSONIC AXIAL COMPRESSOR ROTOR

David William Cornell  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1973  
M.S., Naval Postgraduate School, 1983

The goal in the present work was to examine the flow through the tip section of a transonic compressor rotor in three different ways; (1) using high response instrumentation in the compressor itself, (2) using a blow-down wind tunnel model of the relative flow at the rotor tip, and (3) using a new computer analysis code. Toward that goal, the present study reports the results of extensive measurements made in the compressor and the software developed to acquire and reduce high response transducer data. Modifications made to the cascade and first results of applying S. Eidelman's Godunov code to the compressor rotor tip section are also included. It was concluded that a valid comparison of computed and measured results required both an improvement of the compressor in-flow and an extension of the analysis code to include three dimensional effects.

Aeronautical Engineer's Degree  
September 1983

Advisor: R. P. Shreeve  
Department of  
Aeronautics

# AERONAUTICAL ENGINEER

NUMERICAL SIMULATION OF ATMOSPHERIC FLOW ON VARIABLE GRIDS  
USING THE GALERKIN FINITE ELEMENT METHOD

Donald E. Hinsman  
Commander, United States Navy  
B.S., United States Navy Academy, 1968  
M.S., Naval Postgraduate School, 1975

A hypothesis is made that the Galerkin Finite Element Method (GFEM) offers a viable option to the traditional Finite Difference Method (FDM) for numerical weather prediction. The shallow water barotropic primitive equations are the forecast equations for all experiments. The hypothesis is tested by observing simple, analytic, atmospheric wave propagation on uniform and variable mesh grids. Second, a strongly forced solution simulating small scale nonlinear interactions is evaluated for both the GFEM and FDM. Finally, a variable, moving grid for a GFEM model is compared to a uniform, higher resolution GFEM model for a strong vortex in a mean flow. The GFEM shows a better propagation for simple atmospheric waves and better prediction to a forced nonlinear solution than the FDM model. A moving variable grid follows an area of strong gradients while not generating noise in the transition zone.

Doctor of Philosophy  
March 1983

Advisor: R. T. Williams  
Department of  
Meteorology

# DOCTOR OF PHILOSOPHY

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OPTIMUM DESIGN OF STIFFENED PLATES  
USING THE FINITE ELEMENT METHOD

Chil Sung Park  
Lieutenant Commander, Republic of Korea Navy  
B.S., Republic of Korea Naval Academy, 1972  
B.S.M.E., Seoul National University, 1976

Stiffened plates are designed for minimum volume subject to constraints on: Von Mises maximum stresses, nodal displacements, height to thickness ratios of frame webs, and width to thickness ratios of frame flanges. Design variables are plate thicknesses and stiffener dimensions.

A finite element analysis program is developed for the design of stiffened plates using numerical optimization techniques. The program may be used as a stand alone analysis tool or may be coupled to an optimizer of user's choice. Rectangular plate elements and frame elements are used for the idealization of stiffened plates.

Design examples are presented to demonstrate the design method.

Mechanical Engineer's Degree and  
Master of Science in  
Mechanical Engineering  
March 1983

Advisor: G. N. Vanderplaats  
Department of  
Mechanical Engineering

DEVELOPMENT OF A GIFTS PLOTTING PACKAGE COMPATIBLE  
WITH EITHER PLOT10 OR IBM/DSM GRAPHICS

Thomas R. Pickles  
Lieutenant, United States Navy  
B.S.E.E., United States Naval Academy, 1977

The objectives of this work are to implement the latest version of the Graphics-Oriented Interactive Finite-Element Time-Sharing System (GIFTS) on the IBM-370, to modify the GIFTS plotting package for compatibility with the IBM dual screen management (IBM/DSM) graphics package, and to test the various GIFTS capabilities, some of which have not been used or tested at NPS. GIFTS can now be used with either the IBM dual screen graphics stations or a PLOT10 compatible terminal.

Mechanical Engineer's Degree and  
Master of Science in  
Mechanical Engineering  
June 1983

Advisor: G. Cantin  
Department of  
Mechanical Engineering

**MASTER OF SCIENCE**  
**IN**  
**AERONAUTICAL ENGINEERING**

## MICROCOMPUTER LABORATORY DESIGN

Ronald J. Abler  
Commander, United States Navy  
B.S., Loyola University, 1966  
M.S., Prairie View A & M University, 1975

A microcomputer laboratory was designed and implemented to support Airborne Digital Computation, AE 4641, a course involving a study of the methods used for digital computation in airborne weapons systems. Programming projects in both machine language and assembly language were written, tested, and provided for student exercise. All required operating and driving software was procured or written. Supporting notes, help files, and tutorials were composed. Upon completion of the hardware and software implementation of the laboratory, the laboratory portion of the course was taught by the author, permitting rigorous testing and debugging of all equipment, operating systems, and programs.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: M. D. Hewitt  
Department of  
Aeronautics



AN EXPERIMENTAL INVESTIGATION OF THE COMBUSTION  
BEHAVIOR OF SOLID FUEL RAMJETS

Grant Allan Begley, Jr.  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1975

Limited experimental data indicated that fuel vapor composition within the SFRJ combustor may have a significant effect on the obtainable combustion efficiency and upon the dependence of combustion efficiency upon equivalence ratio and air mass flow rate. Combustor pressure oscillations in bypass operation were found to increase regression rates when using PMM fuel grains and to increase or decrease combustion efficiency depending upon equivalence ratio.

Master of Science in  
Aeronautical Engineering  
December 1982

Advisor: D. W. Netzer  
Department of  
Aeronautics

## UNIVERSAL MICROCOMPUTER INTERFACE FOR DATA ACQUISITION

William Burcher Brown, Jr.  
Lieutenant Commander, United States Navy  
B.E.E., Georgia Institute of Technology, 1971

A Universal Interface Device (UID) was constructed for the TRS-80 Model I microcomputer that enables it to perform a wide variety of digital and analog data acquisition and control functions within the Department of Aeronautics. The system was tested and validated for low frequency data acquisition and control in a wind tunnel experiment and higher frequency applications were predicted with the development of additional software.

The UID consists of a collection of off the shelf and author designed components assembled within a common enclosure to provide eight channels of analog to digital input, a single channel of digital to analog output, eight bit TTL level digital to digital input and output, and eight power relay outputs all under software control of the host microcomputer.

Applications software, calibration tables, and validation experiment were prepared and included within the appendices. The UID produced results within one percent of manual observations.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

# COMPUTER PROGRAMS FOR HELICOPTER HIGH SPEED FLIGHT ANALYSIS

Waldo F. Carmona  
Captain, United States Army  
B.A., University of Dayton, 1973

This report gives the user of the HP41-CV handheld programmable calculator or the IBM 3033 computer, a blade element for calculating the total power required in forward, straight and level high speed flight for an isolated rotor. The computer programs consist of a main program which calculates the necessary dynamic parameters of the main rotor and several subroutines which calculate power required as well as maximum forward velocity, stall onset velocity, and velocity for best endurance.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

## POWERPLANT SELECTION FOR CONCEPTUAL HELICOPTER DESIGN

Timothy Joseph Casey  
Captain, United States Army  
B.S., United States Military Academy, 1973

A method of optimizing the selection of a powerplant based upon engine and fuel weight is developed for use in a conceptual helicopter design course. Historical data is analyzed to verify and modify existing formulae used to estimate engine performance and engine installation weight. Computational programs for use on a hand-held computer and the IBM 3033 are developed to predict analytically engine fuel flow characteristics and to optimize engine selection.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

A GAS TURBINE COMBUSTOR TEST FACILITY FOR  
FUEL COMPOSITION INVESTIGATIONS

Robert William DuBeau  
Lieutenant Commander, United States Navy  
B.S., Monmouth College, 1970

Construction, check-out/verification and initial tests of a full scale gas turbine combustor test facility were accomplished. Water cooled gas sampling and stagnation probes and a multiple wavelength light extinction measurement apparatus for determination of mean particulate size were evaluated. The facility will be used for subsequent fuel composition/fuel additive evaluations to determine the resulting effects on soot production and consumption rates.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: D. W. Netzer  
Department of  
Aeronautics

MONOCHROMATIC HIGH-SPEED PHOTOGRAPHY OF  
SOLID ROCKET PROPELLANT COMBUSTION

Ronald James Edington  
Lieutenant Commander, United States Navy  
B.S., Northern Illinois University, 1970

Eight composite solid propellant formulations containing varying diameter and weight percentages of metallic particles were burned in strand form in two different nitrogen purged combustion bombs at a pressure of 500 psi. High-speed cinematography was used with an argon laser as the primary monochromatic light source. Two illumination approaches were tried, backlighting and frontlighting. Careful examination of the backlighting and frontlighting. Careful examination of the backlighting films revealed that the flame envelopes surrounding the particles could be eliminated and that the true particle size could be obtained. However Schlieren effects obscured much of the information which was available on the film. The frontlighting technique eliminated the Schlieren effects and allowed good particle behavioral data to be obtained, but the reflected monochromatic light was not sufficient to allow true particle diameters to be taken.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: D. W. Netzer  
Department of  
Aeronautics

HOLOGRAPHIC INVESTIGATION OF SOLID PROPELLANT  
COMBUSTION PARTICULATES

Douglas E. Faber  
Commander, United States Navy  
B.S., United States Naval Academy, 1967

This investigation refined the technique for obtaining holographic images of solid propellant combustion products in a two-dimensional motor with high pressure and a cross-flow environment. High quality recordings were made of composite propellants with smokeless metal and aluminum additives which had particulate sizes greater than 45 microns and metal mass content of 5 percent or less by weight. The reconstructed holograms provided data on the behavior of aluminum, zirconium carbide and graphite particulates in a steady state combustion environment as a function of the initial additive size cast into the propellant.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: D. W. Netzer  
Department of  
Aeronautics

PRELIMINARY INVESTIGATION OF ALUMINUM COMBUSTION  
IN AIR AND STEAM

Amos Edward Hallenbeck, Jr.  
Lieutenant Commander, United States Navy  
B.A., State University of New York at Oneonta, 1966  
M.S.A., George Washington University, 1977

The goal of the experiment is to understand the role of metal-steam combustion in the explosion of underwater shaped charges. An apparatus was constructed to investigate combustion of aluminum in steam. For background information, aluminum wires (1 mm diameter, 50 mm length) were ignited in air by high current (480 amperes). Tests in air and steam were photographed using 35 mm color slides and 16 mm movies (4300 frames/sec). Two types of diffusion flames associated with the complete wire were observed, one type of diffusion flame had diffuse pale blue radiation centered on the wire, and another type of flame had intense yellow radiation above the wire. Also, radiation from the wires was measured using Photomultiplier Tubes. Ejected aluminum particles exhibit different combustion properties depending on the environment, air or steam. Particles in air attain velocities of 7 to 11 meters/second and exhibit erratic trajectories before burn out. Particles in steam move at slower speed (2 to 4 m/sec); the particles burn out and re-ignite.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: A. E. Fuhs  
Department of  
Aeronautics



CORRECTIONS AND IMPROVEMENTS TO THE INTERACTIVE COMPUTER PROGRAM FOR THE  
SURVIVABILITY EVALUATION OF AIRCRAFT CONCEPTUAL DESIGNS (VISAP)

Ronald Maxwell Hill  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970  
M.S.B.A., University of Northern Colorado, 1978

A computer program for assessing the survivability of fixed wing aircraft in the conceptual design phase was developed at the Naval Postgraduate School by Ball and Hesser in 1982. The program was called VISAP (Vought Interactive Survivability Assessment Program). This thesis presents corrections and improvements made to VISAP by the author. These corrections and improvements include improved efficiency and friendliness of the program from the user's viewpoint, enhanced output, and the incorporation of graphics to aid in the assessment and evaluation of aircraft conceptual design.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: R. E. Ball  
Department of  
Aeronautics

## REPORT OF TESTS OF A COMPRESSOR CONFIGURATION OF DCA BLADING

Stephen J. Himes  
Lieutenant Commander, United States Navy  
B.S.A.E., United States Naval Academy, 1974

Results of an experimental program to measure the performance of a compressor stator cascade consisting of 20 DCA blades of chord 5.01 inches, aspect ratio 2.0 and solidity 1.67 under conditions of varying incidence angle and Reynolds number are reported. Flow quality and blade performance data were obtained using pneumatic probe surveys and surface pressure measurements. Changes in Reynolds number in the range of 500,000 to 770,000 did not measurably effect either flow quality or blade performance. Changes in incidence angle over the range -15 to 10 degrees produced generally well behaved blade performance parameters.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: R. P. Shreeve  
Department of  
Aeronautics

## A NUMERICAL ANALYSIS OF PIPE FLOW STABILITY

David Bruce Wallace  
Lieutenant, United States Navy  
B.S., University of Kansas, 1975

Standard theoretical methods of analysis which work well for seemingly more complex problems fail to predict the experimentally observed instability of fully developed, incompressible pipe flow at any Reynolds number. Past research by Harrison and Arnold on the stability of pipe flow yielded erroneous results due to errors in the setup of the problem and formulation of the boundary conditions at the axis.

A revised theory with particular attention to the rather complex boundary conditions at the axis has recently been developed. Improved finite differencing techniques with consistent fourth order truncation error were also used to approximate the governing differential equations.

Numerical results for angular wave numbers zero and six show that the flow is stable at all Reynolds numbers. Results for angular wave number one contain instabilities at all Reynolds numbers for small values of the axial wave number. These results are tabulated, plotted, and discussed in detail in this paper.

Master of Science in  
Aeronautical Engineering  
December 1982

Advisor: T. H. Gawain  
Department of  
Aeronautics

EVALUATION OF THE PERFORMANCE AND  
FLOW IN AN AXIAL COMPRESSOR

John Leighton Waddell  
Lieutenant, United States Navy  
B.S.A.E., Texas A&M University, 1974

An experimental evaluation of the axial compressor test rig with one stage of symmetric blading was conducted to determine its suitability for studies of tip clearance effects. Measurements were made of performance parameters and internal flow fields. The configuration tested was found to be unsuitable due to poor flow from the inlet guide vanes, particularly near the tip region. Secondary flows and flaws in construction of the guide vanes were suggested as probable causes. Recommendations were made for a program to resolve the problem.

Master of Science in  
Aeronautical Engineering  
December 1982

Advisor: R. P. Shreeve  
Department of  
Aeronautics

FLOW GENERATION IN A NOVEL CENTRIFUGAL  
DIFFUSER TEST DEVICE

Panagiotis Vidos  
Captain, Hellenic Air Force  
B.S., Hellenic Air Force Academy, 1972

Recognition of the need to develop optimum diffusers for advanced centrifugal compressors, resulted in the design and manufacture of a novel low speed test facility for centrifugal diffuser testing. The CDTD was designed to allow the flow angle and wall boundary profiles into the test diffuser to be controlled by variable geometry in the flow generator. The present study reports on the design of the flow generator and the analysis of the internal flow using a NASA computer code (MERIDL). First test results are given and are compared with the results of a control volume analysis. The flow angle control technique was found to work effectively but to give somewhat smaller angles (by  $4^\circ$ ) than were predicted. It was concluded that the information obtained would allow scaling of the device, however an analysis code was needed which would accept the real physical boundary conditions.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: R. Shreeve  
Department of  
Aeronautics

COMPUTER PROGRAM ANALYSIS OF HELICOPTER WEIGHT ESTIMATE  
RELATIONSHIPS UTILIZING PARAMETRIC EQUATIONS

Rudolph T. Schwab  
Captain, United States Army  
B.S., United States Military Academy, 1973

This thesis gives the user of an HP-41CV handheld programmable calculator or the IBM 3033 computer, acceptable results of helicopter system weight estimations during the preliminary design phase.

The computer program consists of several subroutines and will compute system weight estimates according to Military Standard 1374A. Three categories of military helicopters can be designed; observation, utility, and cargo. Detailed knowledge of helicopters is not required.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

## COMPUTER PROGRAM FOR PRELIMINARY HELICOPTER DESIGN

Michael W. Rogers  
Captain, United States Army  
B.S., United States Military Academy, 1974

This thesis gives the operator of the Hewlett-Packard (HP-41) hand-held calculator the ability to quickly and accurately determine the power requirements of a helicopter in the preliminary design phase. These power requirements are computed for three landing gear configurations: skid, fixed wheel, and retractable wheel. By comparing the power required for each configuration, the user can determine the optimum landing gear for the design.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

DEVELOPMENT OF A FLIGHT SIMULATION CONCEPT AND AERODYNAMIC  
BUILDUP FOR INVESTIGATION OF DEPARTURE  
PREVENTION SYSTEMS IN TACTICAL AIRCRAFT

Albert Lawrence Raithel, III  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The conceptual development of a computer flight simulation for design, testing and analysis of departure prevention systems, simulation capability and programming are discussed, along with required research material and data. A description is given of the aerodynamic buildup program written for incorporation in the simulation, including the aerodynamic equations of the model base aircraft, sample program statement and output.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: M.D. Hewett  
Department of  
Aeronautics



AN EXPERIMENTAL INVESTIGATION INTO THE FOREBODY AND ENGINE INLET AIRFLOW  
CHARACTERISTICS OF A PHOTOGRAPHIC RECONNAISSANCE WINDOW  
PALLET ON THE RF/A-18 AIRCRAFT

Joseph William Poole  
Lieutenant, United States Navy  
B.S., Bowling Green State University, 1975  
M.A., Webster College, 1977

A 1/7 scale model of a Navy F/A-18 forebody was built and tested in the Naval Postgraduate School Aeronautics Department Windtunnel to determine and measure the airflow total pressure distribution at the two engine inlet faces. The lower nose of this scaled model was then modified to incorporate a photographic reconnaissance window pallet, capable of holding two camera sensors within the existing gun bay. The model was retested using the same pressure measurement parameters and compared with the base aircraft test run to determine the airflow changes entering the engine inlets caused by this nose modification. Tufting was used on the model in each case to facilitate flow visualization observations and photography. The results of this investigation show that the pallet design tested caused no change in the airflow entering the intake ducts at low aircraft speeds.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: H. W. Burden  
Department of  
Aeronautics

SCHLIEREN STUDY OF AN ELECTRIC DISCHARGE  
IN AN AIR FLOW

Terry Ray Myers  
Lieutenant Commander, United States Navy  
B.A., University of Florida, 1970  
M.A., U.S. International University, 1978

Performance characteristics of an electric discharge in air are examined utilizing a Schlieren system. Tests are run under flow and no flow conditions and for cross-flow/parallel-flow test sections in configurations analogous to those used in electric discharge convection lasers (EDCL's).

Results indicate that the Schlieren system is satisfactory only for flow velocities under 35 ft/sec and for currents of about 1.2 mA. Photographs of selected test runs are presented and discussed. Recommendations are made concerning more promising methods and techniques for expanding the range of conditions under which satisfactory results may be obtainable. A new design for a cross-flow test section is suggested as a result of this study.

Master of Science in  
Aeronautical Engineering  
March 1983

Advisor: O. Biblarz  
Department of  
Aeronautics

PRELIMINARY ASSESSMENT OF A ROTARY DETONATION  
ENGINE CONCEPT

Stephen A. Monks  
Captain, United States Army  
B.S., United States Military Academy, 1974

Results of preliminary, experimental assessment of a rotary detonation engine concept are reported. Measurements were taken of the torque produced by a stationary rotor model as a result of a single detonation process initiated within the rotor under known premixed gas conditions. Mixtures of ethylene and oxygen and ethylene and oxygen with three moles of nitrogen ballast were utilized. The results represent the lower bound to values of torque produced by the rotor model. Modifications of the instrumentation and torque measurement system are recommended to allow the transient process and resulting torque to be measured in greater detail, a comparison to be made with the results of numerical modeling, and definitive assessment of the potential of the concept to be concluded.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: R. P. Shreeve  
Department of  
Aeronautics

OPTIMIZATION OF A HOLOGRAPHIC RECONSTRUCTION PROCESS  
FOR COMBUSTION PHENOMENA

Marcus A. McInnis  
Lieutenant, United States Navy  
B.S., Maine Maritime Academy, 1975

This investigation addressed the resolution limiting speckle created in diffusely illuminated holographic recordings. Four experimental techniques were investigated to reduce the effect speckle imparted to the holograms of particulates resulting from the combustion process of solid metalized propellants in a two-dimensional rocket motor. The reconstructed holograms are used to provide data on the behavior of aluminum/aluminum oxide particles in a steady state combustion environment. A 1 joule Q-switched pulsed ruby laser was used to illuminate Agfa-Gevaert 10E75 photographic plates. Reconstruction was done with a 1 watt beam from a Krypton laser. Results showed a  $10\mu\text{m}$  improvement in resolution over non-assisted reconstruction techniques allowing discrimination of  $11\mu\text{m}$  particles.

Master of Science in  
Aeronautical Engineering  
December 1982

Advisor: D. W. Netzer  
Department of  
Aeronautics

DETERMINATION OF BOUNDARY LAYER TRANSITION AND SEPARATION  
ON DOUBLE CIRCULAR ARC COMPRESSOR BLADES  
IN A LARGE SUBSONIC CASCADE

Alan G. McGuire  
B.S.A.E., California Polytechnic State University, 1972

The china technique for flow visualization was used to determine the surface flow on a double circular arc (DCA) compressor blade in a large rectilinear subsonic cascade wind tunnel. A calibration experiment using a large flat plate model is also reported which allowed the drying patterns on the DCA blading to be interpreted. Natural transition occurred on the flat plate at a Reynolds Number based on transition location of  $0.8 \times 10^6$ , and on the suction surface of the DCA blading at significant negative incidence angles at a Reynolds Number based on transition location of approximately  $0.5 \times 10^6$ . At incidence angles larger than  $-3^\circ$ , the DCA blade showed a leading edge separation bubble with turbulent reattachment.

Master of Science in  
Aeronautical Engineering  
September 1983

Advisor: R. P. Shreeve  
Department of  
Aeronautics

A MICROCOMPUTER PROGRAM PACKAGE OF THE  
USAF STABILITY AND CONTROL DATCOM

John Randolph McGowen  
Lieutenant, United States Navy  
B.S., University of Kansas, 1975

A microcomputer application program package utilizing the methodology of the USAF STABILITY AND CONTROL DATCOM has been implemented to estimate aircraft stability and control derivatives. The program package is designed for use on personal computer systems which utilize the BASIC programming language.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: M. D. Hewett  
Department of  
Aeronautics

EXPERIMENTAL STUDY OF ELECTROSTATICALLY MODIFIED FUEL  
SPRAYS ON GAS TURBINE COMBUSTOR PERFORMANCE

John A. Mavroudis  
Lieutenant Commander, United States Navy  
B.A., Arizona State University, 1973

The effects of electrostatically modified fuel sprays on gas turbine combustion efficiency have been measured. In addition several electrostatic element configurations were investigated in an effort to overcome the problem of short-circuiting by ionized combustion products.

Electrode voltages of 10kv resulted in exhaust gas temperature rises of 50° to 60° F. indicative of combustion efficiency improvement, for JP-5 and Jet-A fuels tested under fuel-rich operating conditions. A temperature rise of 100° F was obtained during the testing of DF-2 at similar fuel-air ratios. The results at fuel-lean ratios was complicated by the problem of maintaining a continuous electrostatic field while the electrode was in close proximity to the combustion gases. Nevertheless, similar improvements in combustion efficiency were observed for JP-5 and Jet-A fuels during fuel-lean operation.

Master of Science in  
Aeronautical Engineering  
December 1982

Advisor: O. Biblarz  
Department of  
Aeronautical Engineering

## GUIDE FOR CONCEPTUAL HELICOPTER DESIGN

Stephen Glenn Kee  
Captain, United States Army  
B.S., United States Military Academy, 1973

A conceptual helicopter design method utilizing closed form formulas and approximations from historical data is developed for use in a helicopter design course. The design manual is to be used for the conceptual design of a single main rotor, utility helicopter. The manual was written principally for use in AE4306--Helicopter Design.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: D. M. Layton  
Department of  
Aeronautics



## HELICOPTER VERTICAL STABILIZER DESIGN CONSIDERATIONS

James E. Young  
Captain, United States Army  
B.S., United States Military Academy, 1973

Helicopter vertical stabilizer design considerations are receiving increasing emphasis from the helicopter community. Recent development programs experienced problems with respect to the empennage. Naval Postgraduate School Helicopter Design Course sophistication demands inclusion of vertical stabilizer parameters. The parameters are addressed in terms of conventional airfoil design considerations such as airfoil section, planform area, aspect ratio, camber, and sweep back angle. Specific to helicopters is the relationship to the tail rotor. The fundamental design tradeoff is maximum vertical stabilizer size to optimize directional stability and flight with zero tail rotor thrust contrasted to minimum size to optimize tail rotor blockage effects. A conceptual design procedure is developed herein.

Master of Science in  
Aeronautical Engineering  
June 1983

Advisor: D. M. Layton  
Department of  
Aeronautics

**MASTER OF SCIENCE**  
**IN**  
**APPLIED MATHEMATICS**

ON THE DISTRIBUTION OF COMPLEXITY  
FOR DE BRUIJN SEQUENCES

Robert LaVern Holdahl  
Major, United States Marine Corps  
B.S., South Dakota State University, 1972

Binary sequences have had application in communication systems for many years. Shift registers have been used in their generation, because of the ease and economy of their operation. For certain applications, nonlinear feedback functions are used by shift registers of span  $n$  to generate sequences of lengths up to  $2^n$ .

The sequences of maximum length  $2^n$  and their generation are the subject of this thesis. In particular the ways of generating these sequences using nonlinear feedback shift registers and their correlation to linear feedback shift registers are described. Complexity is the term given to the length of the shortest linear feedback shift register generating a maximum length  $2^n$  sequence.

Games and Chan [Ref. 1] have given considerable study to the subject of complexity. Some of the problems they left are discussed further in this paper. It will be shown that the complexity of a de Bruijn sequence  $(S)$  is the same as the complexity of its reverse  $(r S)$ , complement  $(\bar{S})$ , and its reverse complement  $(r \bar{S})$ . Sequences  $(S)$  for which  $r S = \bar{S}$  are termed RC sequences. It is shown that RC sequences exist for every odd  $n \geq 3$ . In addition a lower bound will be established for the number of RC sequences occurring for each odd  $n$ .

Master of Science in  
Applied Mathematics  
June 1983

Advisor: H. Fredricksen  
Department of  
Mathematics

**MASTER OF SCIENCE**  
**IN**  
**APPLIED SCIENCE**

## NON-PARAMETRIC STATISTICAL SOFTWARE FOR THE TRS-80 MICROCOMPUTER

Robert Lee Zangmeister, Jr.  
B.E.E., University of Louisville, 1971

This paper documents the development of a non-parametric statistics package for the TRS-80 microcomputer. The package is comprised of ten programs with the major emphasis on non-parametric hypothesis testing.

The programming language is TRS-80 Level II Disk Basic. The package is compatible with any disk based TRS-80 Model I/III compatible microcomputer. With modification of the screen display and the disk access commands, the package is transportable to microcomputers produced by other manufacturers.

The statistical analysis capability implemented on a relatively inexpensive system provides a useful tool to the student or the trained analyst.

Master of Science in  
Applied Science  
December 1982

Advisors: J. D. Esary  
R. R. Read  
Department of  
Operations Research

**MASTER OF SCIENCE**

**IN**

**COMPUTER SCIENCE**

## PROGRAM FAMILY FOR EXTENDED PRETTY PRINTER

Tae Nam Ahn  
Captain, Republic of Korea Army  
B.S., Korea Military Academy, 1975  
B.S., Seoul National University, 1979

This thesis presents a design and partial implementation of a program family of extended pretty printers. Factors that influence the readability (perception) and understandability (cognition) of computer programs are identified, previous work is reviewed, and new solutions are suggested. Extensions to the previous pretty printer designs include a capability to selectively display levels of control of a program. In order to accommodate different computer languages and to allow for several secondary functions, a family of pretty printers is designed. This design facilitates easy extension, contraction and modification.

Master of Science in  
Computer Science  
June 1983

Advisor: G. H. Bradley  
Department of  
Computer Science

ALTERATION AND IMPLEMENTATION OF THE CP/M-86 OPERATING  
SYSTEM FOR A MULTI-USER ENVIRONMENT

Thomas V. Almquist  
Lieutenant Commander, United States Navy  
B.S.A.E., North Carolina State University, 1971

David S. Stevens  
Captain, United States Army  
B.S.E., United States Military Academy, 1974

C/PM-86 is a single user microcomputer operating system developed by Digital Research. This thesis provides a multi-user "protected" CP/M-86 based disk sharing environment consisting of four Intel iSPC 86/12A single board computers, a MBB-80 bubble memory, and the REMEX Data Warehouse 3200 memory storage unit. The REMEX houses a 14 inch Winchester hard disk and two flexible floppy disk drives providing in excess of 20 megabytes of data storage capacity. The major objective in the design of this system was to create a table-driven CP/M-86 Basic Input/Output System that could be quickly and easily reconfigured to adapt to any new hardware configuration. Once the system was operational, the REMEX hard disk could then serve as a "signal processor" emulation for the AEGIS system. By making direct calls to the appropriate read/write routines, stored "radar data" could be retrieved from the hard disk for use by the other system processes.

Master of Science in  
Computer Science  
December 1982

Advisor: U. R. Kodres  
Department of  
Computer Science



## THE INTEL 432/670 AND ADA PERFORMANCE BENCHMARKS

David Applegate  
Lieutenant, United States Navy  
B.A., St. Cloud State University, 1975

Robert Coates  
Captain, United States Marine Corps  
B.S., University of Idaho, 1976

The INTEL 432/670 microcomputer system contains the iAPX-432 microprocessor which executes compiled ADA programs. The compiler resides on a host VAX 11/780, and compiled programs are downloaded to an INTEL MDS 800 system where they are transferred to the 432/670 for execution. This thesis describes a preliminary performance evaluation of the INTEL 432/670 through the use of selected benchmark algorithms from the Computer Family Architecture (CFA) study. A description of the hardware components of both the MDS 800 and 432/670 is provided, including the modifications made to the operating system to allow compatibility with existing hardware. Additionally, the benchmark program source code and a user's manual are appended.

Master of Science in  
Computer Science  
December 1982

Advisor: U. R. Kodres  
Department of  
Computer Science

BENCHMARKING THE SELECTION AND PROJECTION OPERATIONS, AND ORDERING  
CAPABILITIES OF RELATIONAL DATABASE MACHINES

Robert A. Bogdanowicz  
Lieutenant, United States Navy  
B.S., Illinois Institute of Technology, 1977

This thesis describes the performance-measurement experiments designed for a number of backend, relational database machine configurations. An in-depth study of the tests and results of the two relational operations, namely, selection and projection, on a specific configuration is presented. In addition, tests are made on the ordering capabilities and performance of the machine configuration. The goal of the work is to lead to a development for a machine-independent methodology for benchmarking the selection and projection operations and on ordering capabilities of database machines.

Master of Science in  
Computer Science  
September 1983

Advisor: D. K. Hsiao  
Department of  
Computer Science

THE NATIONAL COMMUNICATIONS MODULE OF THE STOCK POINT LOGISTICS  
INTEGRATED COMMUNICATIONS ENVIRONMENT  
(SPLICE) LOCAL AREA NETWORKS

David D. Carlsen  
Captain, United States Army  
B.S., Brigham Young University, 1975

Dan P. Krebill  
Captain, United States Army  
B.S., United States Military Academy, 1973

This thesis discusses the development of an interconnection of Stock Point Logistics Integrated Communications Environment (SPLICE) local area networks with the Defense Data Network (DDN). The interconnection is done through what is called the National Communications (NC) module. After an introduction to SPLICE and DDN, a User's Manual for NC is presented, defining the environment and interfaces of NC. Then, the motivation behind the NC design and its operational context is explained in detail. Implementation issues are discussed next. Finally, the structure of NC is depicted by HIPO charts, pseudo-code and Ada language constructs.

Master of Science in  
Computer Science  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Computer Science

SPECIFICATIONS OF A SIMULATION MODEL FOR A LOCAL AREA  
NETWORK DESIGN IN SUPPORT OF STOCK POINT LOGISTICS  
INTEGRATED COMMUNICATION ENVIRONMENT (SPLICE)

Cosmos P. Charpantidis  
Commander, Hellenic Navy  
B.S., Hellenic Naval Academy, 1965

This thesis provides the specifications of a simulation model, based on a given functional design for a Local Area Network (LAN) system, which implements functions of the Stock Point Logistics Integrated Communication Environment (SPLICE). First, today's LAN technologies and workload characterization of the SPLICE system are discussed in general. Then, the components of the LAN system and the model assumptions are identified in terms of an open network of queues. Finally, an initial approach for model implementation in GPSS is provided.

Master of Science in  
Computer Science  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Computer Science

# BENCHMARKING THE JOIN OPERATIONS OF RELATIONAL DATABASE MACHINES

Michael D. Crocker  
Lieutenant, United States Navy  
B.S., Auburn University, 1976

Over the past several years benchmarking has been developed into an effective technique for performance analyses of computer systems. Relational database machines are relatively new computer systems for which a benchmarking technique does not yet exist.

The benchmarking of relational database machines involves the identification and design of test programs through which relevant performance data can be gathered and interpreted. All features of relational database management must be considered when designing these test programs. The join operations are an important feature of relational database management.

The test programs for the join operations necessarily include the repetition of certain queries during which specific join parameters are varied. These parameters include: tuple size, relation size, disk placement, and the use of indices. A number of join operations have been benchmarked. These operations are equality joins, inequality joins, three-way joins, and virtual joins (i.e., views). In addition, a number of relational database machine configurations have been utilized for benchmarking the join operations.

Master of Science in  
Computer Science  
June 1983

Advisor: D. K. Hsiao  
Department of  
Computer Science

PROPOSAL FOR STOCK POINT LOGISTICS INTEGRATED  
COMMUNICATIONS ENVIRONMENT (SPLICE) LOCAL  
AREA NETWORK RISK MANAGEMENT

Sharron K. Crowder  
Lieutenant, United States Navy  
B.A., University of Texas, 1977

Jan M. Adams  
Lieutenant, United States Navy  
B.S., Sam Houston State University, 1975

The SPLICE system is designed to integrate a variety of current and projected NAVSUP processing and telecommunications applications. The operation of the more than twenty new applications systems currently under development will increase the Navy's dependence on automated support, and will require that the risk of operating the SPLICE data processing environment be evaluated and managed at an acceptable level. This thesis identifies the requirements for implementing a Risk Management Program, provides a formal model for the quantification and management of risk, and examines contemporary technical and managerial countermeasures which could be effective in reducing the operational risk of SPLICE.

Master of Science in  
Computer Science  
December 1982 (Crowder)

Advisor: N. F. Schneidewind  
Department of  
Computer Science

Master of Science in  
Informations Systems  
December 1982 (Adams)

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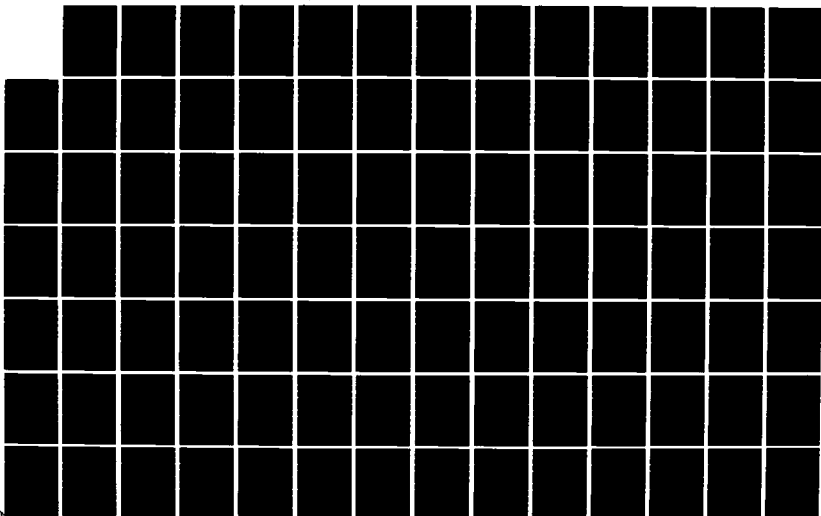
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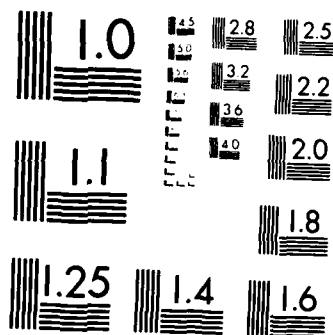
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A



## THE DATABASE MANAGEMENT MODULE OF THE SPLICE SYSTEM

E. Jean Dixon  
Lieutenant, United States Navy  
B.S., Lander College, 1974

SPLICE (Stock Point Logistics Integrated Communications Environment) is a plan designed to automate data handled at Stock Points and inventory Control Points for the United States Navy Supply System. The SPLICE concept involves the use of a number of Local Area Networks which communicate via the Defense Data Network. As a part of the ongoing research in the implementation of SPLICE, this thesis addresses the Database Management Module of the Local Area Network and possible problem areas which may be encountered when this module is finally in place. A proposed conceptual design of the database is presented and database computers are evaluated for possible use in SPLICE.

Master of Science in  
Computer Science  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Computer Science

A HEURISTIC FOR DECOMPOSING A PROBLEM INTO  
A SEQUENCE OF SUBPROBLEMS

Donald Vincent Evans  
Captain, United States Marine Corps  
B.S., Southern University and A&M College, 1977

This thesis presents a method for decomposing a specification of a problem into a sequence of subproblem specifications. The method uses the specification to build a tree-like structure called a sematic net. The net is then used to construct a sequence of subspecifications. Each subspecification of the sequence represents a subproblem. Composition of the solutions to the subproblems results in a solution to the given problem specification.

In this work, we present an intuitive approach to what Artificial Intelligence and program synthesis is, define the sequence problem associated with program synthesis is, define the sequence problem associated with program synthesis, and present the method for deriving a sequence of subspecifications. When this has been done, the method is then applied to a specific problem domain called the Blocks World. We then consider the method in a non-Blocks World domain and follow with a summary.

Master of Science in  
Computer Science  
December 1982

Advisor: D. R. Smith  
Department of  
Computer Science

TAC\*II AN EXPERT KNOWLEDGE BASED SYSTEM  
FOR TACTICAL DECISION MAKING

Mark J. Geschke  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1973

Robert A. Bullock  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1975

Linda E. Widmaier  
Lieutenant, United States Navy  
B.S., Pennsylvania State University, 1974

There exists a genuine need for a tactical decision making system within the Department of Defense for the small scale environment tactical decision maker. To this end, we propose TAC\*II, a prototypical system for tactical decision making, to be implemented as a distribution system on microcomputers. TAC\*II is a redesign and partial implementation of an expert Artificial Intelligence system proposed by previous Naval Postgraduate School students. The system receives preprocessed sensor inputs, determines what contacts are present, and suggests the best possible actions to take. It performs target analysis and correlation based on the current tactical situation. Production rules are used to discover which actions have been established by higher authority for the current tactical situation. A pattern matching algorithm provides a heuristic means of identifying similar known situations, and suggests actions to take based on those situations.

Master of Science in  
Computer Science  
June 1983

Advisor: D. R. Smith  
Department of  
Computer Science

EVALUATION OF LOCAL AREA NETWORK ARCHITECTURES  
FOR THE STOCK POINT LOGISTICS INTEGRATED  
COMMUNICATIONS ENVIRONMENT (SPLICE)

Louis S. Hollier, IV  
Major, United States Marine Corps  
B.S., United States Naval Academy, 1970

The Navy Supply Systems Command has developed the Stock Point Integrated Logistics Communications Environment (SPLICE) concept. It will be a foreground and background distributed system built around local area networks. This research describes an evaluation strategy to identify off-the-shelf local area network architectures to support SPLICE. The strategy develops a performance classification system for local area network architectures and identifies evaluation guidelines based on the functional needs of the SPLICE system. Then the evaluation process is implemented to identify example local area network products with architectures that meet SPLICE needs. An example local area network architecture is identified as an architecture that can support computer networking needs in the SPLICE background environment of mainframe computers. A second example local area network architecture is identified with the performance capabilities necessary to support a foreground environment of supply customer work stations.

Master of Science in  
Computer Science  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Computer Science

THE DEVELOPMENT OF A STANDARD DATABASE SYSTEM FOR  
REPUBLIC OF KOREA ARMY'S PERSONNEL MANAGEMENT

Dae Sik Hong  
Captain, Republic of Korea Army  
B.S., Kyung Pook National University, 1975

This thesis presents the development of a database system for Republic of Korea Army's personnel management. Database processing has grown significantly in computer science areas and also in management of certain organizations. Database system designers establish objectives of database system organizations before initiating development. An important consideration in database development is to assure that it can be used for a wide variety of application and can be changed quickly and easily. ROK Army needs an end-user application system because users usually require statistical information periodically. Software engineering goals are discussed to develop an efficient end-user application system. To address software engineering goals, top-down design and structured programming technique are used as tools.

Master of Science in  
Computer Science  
June 1983

Advisor: S. H. Parry  
Department of  
Operations Research

DESIGN AND IMPLEMENTATION OF A BASIC CROSS-COMPILER AND VIRTUAL MEMORY  
MANAGEMENT SYSTEM FOR THE TI-59 PROGRAMMABLE CALCULATOR

Mark R. Kindl  
Captain, United States Army  
B.S., United States Military Academy, 1974

James H. W. Inskeep, Jr.  
Captain, United States Army  
B.S., United States Military Academy, 1974

The instruction set of the TI-59 Programmable Calculator bears a close similarity to that of an assembler. Though most of the calculator instructions perform primitive data movement and/or sequence control, some can do the work of small high level language procedures. Regardless of this fact, to design and debug TI-59 programs of moderate size can be more difficult than doing the computations themselves. Programming in a higher order language such as BASIC offers many advantages over calculator code. This report presents the design and implementation of a crosscompiler which translates correct BASIC programs into equivalent TI-59 programs. This software package includes a linker which maps calculator instructions to a set of magnetic cards. The cards are then used to implement a manually operated virtual memory system for the calculator. This expands program step capacity, and permits more complex programs to be written in BASIC language for translation into TI-59 instructions.

Master of Science in  
Computer Science  
June 1983

Advisor: B. J. MacLennan  
Department of  
Computer Science

SIGNAL PROCESSOR INTERFACE SIMULATION  
OF THE AN/SPY-1A RADAR CONTROLLER

Todd B. Kersh  
Captain, United States Army  
B.S., United States Military Academy, 1973

This thesis reports on the design and implementation of a simulation of the signal Processor Interface to the AN/SPY-1A Phased Array Radar Controller. Inherent to the simulation is the development of a representative time sensitive database of the targeting environment. The programming language Ada was utilized as a program development language in the design for the database. The developed Target Database utilizes the 20 mega-byte REMEX Data Warehouse 3200 memory storage unit. The simulation of the Signal Processor Interface will allow real time testing of the Naval Postgraduate School's AN/SPY-1A Radar Controller System Model.

Master of Science in  
Computer Science  
June 1983

Advisor: U. Kodres  
Department of  
Computer Science

## THE DESIGN OF BACKTRACK ALGORITHMS

Gary Loberg  
Captain, United States Army  
B.S., United States Military Academy, 1973

The backtrack control structure is a well known combinatorial problem solving approach in computer science. The strategy can be abstracted into a program schema with slots for lower level functions which is suitable for the automated synthesis of backtrack programs. Employing a known model of program synthesis based on a problem reduction problem representation, two reduction rules are developed for transforming a problem specification into a backtrack control structure with specifications for lower level functions. We illustrate these rules with sample problems.

Master of Science in  
Computer Science  
June 1983

Advisor: D. R. Smith  
Department of  
Computer Science



DESIGN AND IMPLEMENTATION OF SOFTWARE PROTOCOL IN  
VAX/VMS USING ETHERNET LOCAL AREA NETWORK

Thawip P. Netniyom  
Second Lieutenant, Royal Thai Army  
B.S., Phillipine Military Academy, 1981

This thesis presents the design and implementation of a software protocol for the VAX-11/780, under the VMS operating system, to allow message and file transfer to and from the INTELIEC MDS system, under CP/M-80 operating system, via the Ethernet local area network.

The design of this software protocol is based on the protocol hierarchies where the network is organized as a series of layers of levels, each one build upon its predecessor. The purpose of each layer is to offer certain services to the higher layers, shielding those layers from the details of how the offered services are actually implemented.

With this design concept, the desired software protocol will be transportable in the sense that it can be used by different kinds of computer systems with minimal modifications.

The Ethernet local area network is also designed in this same highly structured way.

Master of Science in  
Computer Science  
June 1983

Advisor: U. R. Kodres  
Department of  
Computer Science

ANALYSIS OF THE RELATIONAL DATA BASE MODEL IN SUPPORT  
OF AN INTEGRATED APPLICATION SOFTWARE SYSTEM

Rodney Nishimura  
Lieutenant, United States Navy  
B.S., University of Southern California, 1975

The premise of this thesis is that many software application systems perform similar functions on a data object and contain a significant operational intersection. An Integrated Application Software System (IASS) integrates the capabilities of the applications into one system. The purpose of this thesis is to evaluate the utility of the relational database model to conceptually integrate the text processing, relational database management, form generating, electronic mail, and electronic modeling applications.

The conclusion of this study is that the relational database model can conceptually support the data representation and manipulation requirements of each application considered. Furthermore, the integrated system has potential capabilities that are not available in the non-integrated set of applications.

Master of Science in  
Computer Science  
December 1982

Advisor: D. Z. Badal  
Department of  
Computer Science

A USER-ORIENTED MICROPROCESSOR SHELL  
COMMAND LANGUAGE INTERPRETER

Dennis J. Ritaldato  
B.S.E.E. Villanova University 1974  
M.S.E.E. Drexel University 1981

David J. Smania  
Lieutenant Commander, United States Navy  
B.S. Weber State College 1972  
M.A. Pepperdine University 1979

The design of a microprocessor command language, RSCL, is discussed. RSCL provides the capability of building variable shell environments on a standard microprocessor system. These environments present a menu driven, screen oriented user interface as opposed to the line oriented interface of current operating systems.

The RSCL is a straightforward, easily understandable and complete computer programming language. Designed according to specific command language guidelines. It allows the user to make maximum utility of his skills.

A prototype implementation and sample program runs are included. These illustrate the design features and serve as a test platform for future research.

Master of Science in  
Computer Science  
September 1983

Advisor: R. W. Modes  
Department of  
Computer Science

INTEL 432/670 ADA BENCHMARK PERFORMANCE EVALUATION  
IN THE MULTIPROCESSOR/MULTIPROCESS ENVIRONMENT

Theodore F. Rogers, Jr.  
Captain, United States Navy  
A.A., Potomac State College, 1960  
B.S.E.S., Naval Postgraduate School, 1968

Ioannis A. Karadimitropoulos  
Captain, Hellenic Army  
B.S., Hellenic Military Academy, 1971  
M.S.M.E., Engineering School of Athens, 1977

The INTEL 432/670 microcomputer system contains the iAPX-432 microprocessor which executes compiled Ada programs. This thesis contains performance evaluation of the INTEL 432/670 system in a multiprocessor/multiprocess environment. Benchmark programs from the computer Family Architecture (CFA) study are encoded in the Ada Programming Language and compiled on a host VAX 11/780 before being downloaded to INTEL MDS 800 for further transfer to the INTEL 432/670 system for execution. The historical development of computer architectures as well as a systematic description of the INTEL 432/670 system are included.

Master of Science in  
Computer Science  
June 1983

Advisor: U. R. Kodres  
Department of  
Computer Science

# INVESTIGATIONS INTO THE PERFORMANCE OF A DISTRIBUTED ROUTING PROTOCOL FOR PACKET SWITCHING NETWORKS

Anthony W. Lengerich  
Lieutenant Commander, United States Navy  
B.A., University of Colorado, 1971

Packet switching communications networks employ routing protocols to determine the path traversed by each packet as it passes through the network. Routing protocols which are adaptive and can restructure the packet paths in response to localized network congestion are called "dynamic" routing protocols. Dynamic routing protocols seek to optimize the routing (provide the shortest path) for each packet in the network. Routing protocols which are unaffected by the addition or deletion of any subset of nodes are called "distributed" routing protocols. The relative performance of two distributed, dynamic routing protocols is determined using computer simulations. The protocols are implemented on four theoretical networks and tested under a range of network traffic loads.

Master of Science in  
Electrical Engineering  
December 1972

Advisor: J. M. Wozencraft  
Department of  
Electrical Engineering

INTERACTIVE MICROCOMPUTER CONTROL SYSTEM MODELING AND REALIZATION  
USING A DATABASE FOR AUTOMATIC PROGRAMMING

Roger Francis Johnsrud  
Lieutenant, United States Navy  
B.S.F.E., University of Washington, 1975

A program for control system modeling, simulation, and realization useable by the novice programmer was developed for interactive use on a microcomputer. The program used two software packages; PL/1-80 from Digital Research and DBASE II from Ashton Tate.

The paper covers a complete example for modeling and simulation of a minimum time response ripple free controller for a  $1/S^2$  Plant. The program uses two sample rates, one for modeling the computer and the other for modeling the plant. Variable delays due to computer computation are included and corrected semi-transparent to the control designer.

This thesis covers two different fields of interest, one for the experienced control system designer yet a novice programmer, and the other for the novice control designer yet an experienced computer programmer. Key programming concepts include using a business database to automatically program a control problem requiring a scientific language.

Master of Science in  
Electrical Engineering  
December 1982

Advisor: A. Gerba, Jr.  
Department of  
Electrical Engineering

## AIRCRAFT STATE ESTIMATION FOR A GROUND DIRECTED BOMBING SYSTEM

John A. Jauregui  
Captain, United States Marine Corps  
B.S., United States Naval Academy, 1973

The performance of a modified linear Kalman filter with adaptation is compared with that of a common adaptive alphabeta filter for state estimation of a pilot controlled, ground directed bombing system. Of particular concern is the accuracy and response of the alternative filters when the aircraft conducts maneuvers in the vicinity of the target. The desirability of including deterministic forcing in the filter model is discussed and a technique utilizing an adaptive Kalman identifier to establish the pilot response to ground control heading inputs is presented.

Master of Science in  
Electrical Engineering  
December 1982

Advisor: H. A. Titus  
Department of  
Electrical Engineering

## AUTOMATED DESIGN OF MICROPROCESSOR-BASED DIGITAL FILTERS

Martin Ralph Heilstedt  
Lieutenant, United States Navy  
B.E., Vanderbilt University, 1976

This thesis investigates the feasibility of automating the design of microprocessor-based digital filters. The ability of a prototype design system to successfully produce filter realizations is tested. General filter structures and programming algorithms are presented. Shortcomings in the current version of the design system are determined. Modifications are made as required to support digital filter realizations. The feasibility of filter generation is demonstrated using realistic examples taken from the literature.

Master of Science in  
Electrical Engineering  
June 1983

Advisor: H. H. Loomis  
Department of  
Electrical Engineering



AN APPROACH FOR IMPLEMENTING A MICROCOMPUTER BASED REPORT ORIGINATION  
SYSTEM IN THE ADA PROGRAMMING LANGUAGE

Michael Richard Critz  
Lieutenant, United States Navy  
B.S., Rensselaer Polytechnic Institute, 1975

This thesis examines the use of an inexpensive commercial micro-computer for the preparation of Naval Reporting Structure Operational Reports. These highly formatted reports provide critical unit information used by the National Command Authority and Joint Chiefs of Staff in assessing the nation's defense posture. Since these reports are processed by computer, correct formatting and data entry are essential to preserve the timeliness and accuracy of the information. The requirements of a Report Origination System are investigated from the perspective of the system operator, the message drafter and the message releasing authority. Interfaces are developed which provide for system application to different hardware configurations. A subset of the Ada language is used to allow structured programming and data abstraction techniques. Elements of the Unit Status and Identity Report (UNITREP) are implemented using this method.

Master of Science in  
Electrical Engineering  
March 1983

Advisors: H. Titus  
Department of  
Electrical Engineering

G. R. Porter  
Department of  
Operations Research

# VLSI DESIGN OF A 16 BIT VERY FAST PIPELINED CARRY LOOK AHEAD ADDER

Joseph Robert Conradi  
Lieutenant, United States Navy  
B.S., University of Louisville, 1977

Bruce Robert Hauenstein  
Lieutenant, United States Navy  
B.S., University of Louisville, 1976

This thesis is an introduction to the use of computer-aided design (CAD) tools for the design of very large scale integrated circuits (VLSI). The techniques are described and a tutorial is given which illustrates their use in the computing environment at the Naval Postgraduate School. The CAD tools were applied to design a 16-bit fast pipelined adder.

Master of Science in  
Electrical Engineering  
September 1983

Advisor: D. E. Kirk  
Department of  
Electrical Engineering

## LATTICE MODELING OF AN ANALOG SYSTEM FOR FAULT LOCATION

Zacarias S. Chavez

Lieutenant Commander, United States Coast Guard  
B.S., DeVry Institute of Technology, 1976

The rapid growth of electronic design, attributed to the availability of modern digital computers, has produced increasingly complex systems that require tremendous maintenance support. Automatic testing and troubleshooting features in digital, as well as analog systems, greatly reduce maintenance cost and improve system reliability. Lattice modeling is relatively new in the field of analog fault diagnosis. This research is the investigation of a simple fault location algorithm that features single channel autoregressive lattice modeling, as applied to a three pole Chebyshev low-pass filter. A Monte Carlo simulation to determine the robustness of the lattice fault location algorithm is discussed. Component sensitivity is considered in the simulation. An actual physical experiment using a breadboarded circuit, a white noise generator and a general purpose desktop computer verifies the results of the simulation. The results strongly suggest that lattice modeling is a powerful and effective method that may be applied to fault diagnosis in an analog system.

Master of Science in  
Electrical Engineering  
September 1983

Advisor: S. R. Parker  
Department of  
Electrical Engineering

HARDWARE AND SOFTWARE IMPLEMENTATION OF AN INTERFACE BETWEEN  
THE UNIBUS AND THE GENERAL PURPOSE INTERFACE BUS

Ayers Haden Blocher III  
Lieutenant Commander, United States Navy  
B.S., University of Missouri at Rolla, 1972

The Satellite Communications Laboratory at the Naval Postgraduate School used a PDP-11/34A minicomputer to develop software in support of a satellite signal monitoring system. The General Purpose Interface Bus (GPIB) interconnects several general measurements devices used in support of the laboratory. The laboratory uses these measurement devices for diagnostic and simulation tests related to research in the satellite signal monitoring field. This thesis discusses the development of the hardware and software interface between the PDP-11/34A Unibus and the GPIB. The interface permits high level language programs under the control of the Unix operating system (version 6) on the PDP-11/34A to access any device on the GPIB.

Master of Science in  
Electrical Engineering  
March 1983

Advisor: K. G. Gray  
Department of  
Electrical Engineering

**MASTER OF SCIENCE**  
**IN**  
**ELECTRICAL ENGINEERING**

## INTEGRATED APPLICATION SOFTWARE SYSTEM

John Christopher Waters  
Lieutenant, United States Navy  
B.S., Rensselaer Polytechnic Institute, 1977

As increasing data processing power becomes available at decreasing cost, greater numbers of nontechnical personnel are gaining access to automated systems that enhance their productivity. However, the sharp distinction between each of the support packages, and the requirement for the user to become familiar with different models, concepts and vocabularies is a barrier to reaching higher effectiveness. The premise is that these common support systems have equivalent functions and a large intersection of operations that can be integrated. It is the purpose of this thesis to study a possible Integrated Application Software System (IASS) that will combine the needed capabilities into a functional system and present the user with a single data model and vocabulary set. The data model which is proposed for use by the IASS is the relational data model, since it is universally understandable, and has a robust theoretical foundation.

Master of Science in  
Computer Science  
December 1982

Advisors: D. Z. Badal  
Department of  
Computer Science

CONCURRENCY CONTROL IN DISTRIBUTED SYSTEMS WITH  
APPLICATIONS TO LONG-LIVED TRANSACTIONS  
AND PARTITIONED NETWORKS

James E. Vesely  
Major, United States Marine Corps  
B.S., University of Northern Illinois, 1975

Jonathan C. White  
Captain, United States Marine Corps  
B.S., Tulane University, 1976

The maintenance of consistency in a distributed database system environment presents a number of vexing problems to the database system designer. This is more so the case when the database system contains replicated data and is also designed to provide a high degree of availability under conditions of network partitioning.

This thesis investigates the use of a proposed adaptive concurrency control algorithm as a possible alternative solution for a number of the problems facing the data base system designer in the areas of concurrency control, partitioned networks, and long-lived transactions.

Master of Science in  
Computer Science  
June 1983

Advisor: D. Z. Badal  
Department of  
Computer Science

## DESIGN OF RELATIONAL DATABASE BENCHMARKS

Vincent Courtney Stone  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1974

Performance measurements of a database machine reflect not only the processing power of the machine, but also the size and structure of the database. It is therefore useful to construct databases for performance measurements of database machines. Furthermore, it is useful to utilize synthetic data, such that the volume of the reply can be predicted for a given query and the structure and attributes of the database can be varied for intended test queries. Conducting measurement studies using a synthetic database contributes to the generality of the results when different test queries are employed. A parameterized program is described herein which can be used to generate various relations for a synthetic database. The experiences in constructing and using the database generator are described. It is suggested that given sufficient information on real-world databases the generator may be useful for modelling them as well as for creating databases for benchmark tests.

Master of Science in  
Computer Science  
June 1983

Advisor: D. K. Hsiao  
Department of  
Computer Science



USER-FRIENDLY, SYNTAX DIRECTED INPUT TO A  
COMPUTER AIDED DESIGN SYSTEM

Barbara J. Sherlock  
Lieutenant Commander, United States Navy  
B.A., Wellesley College, 1972  
M.B.A., Pepperdine University, 1975

This paper describes the development of a user-friendly, syntax directed input module of a computer aided design system. Color and dialogue are used to maximize user understanding and ease of interface, and minimize the opportunity for error. As a result, it is possible for the user to concentrate on the higher level aspects of the design, and allow the system to handle the routine details.

Master of Science in  
Computer Science  
June 1983

Advisor: A. A. Ross  
Department of  
Computer Science

BENCHMARKING RELATIONAL DATABASE MACHINES' CAPABILITIES IN  
SUPPORTING THE DATABASE ADMINISTRATORS' FUNCTIONS AND  
RESPONSIBILITIES

Curtis M. Ryder  
Lieutenant Commander, United States Navy  
B.S., Florence State University, 1972

This thesis describes the functions of the Database Administrator (DBA) and how they are supported by the benchmarked relational database machine. An examination of the relational query language provided, DBA support services required, the performance issues involved, and the security features employed is presented. The goal for this work is to develop general guidelines for DBA to follow in implementing and operating an effective, responsive database system.

Master of Science in  
Computer Science  
September 1983

Advisor: D. K. Hsiao  
Department of  
Computer Science

LOGIC DESIGN OF A SHARED DISK SYSTEM IN A  
MULTI-MICRO COMPUTER ENVIRONMENT

Mark L. Perry  
Captain, United States Army  
B.S., Purdue University, 1976

This thesis describes the detailed interface design and implementation of the Micropolis 1220 rigid disk storage unit into the AEGIS multiuser environment. At the onset of this work, the AEGIS development system consisted of an MBB-80 bubble memory, the REMEX Data Warehouse disk system, and four INTEL iSBC 86/12A single board computers. The Micropolis interface was accomplished utilizing the INTEL 8255 programmable parallel I/O port resident on one of the AEGIS iSBC 86/12A computers. The iSBC 86/12A used for the interface can still be operated as an independent computer with all Micropolis disk operations being transparent to the user. The Micropolis disk unit adds an additional 35.6 megabytes of online storage to the AEGIS system. Utilization of the Micropolis disk system as a software development storage media will free the REMEX Data Warehouse for storage of "radar data" to emulate the SPY-1A radar.

Master of Science in  
Electrical Engineering  
June 1983

Advisor: M. L. Cotton  
Department of  
Electrical Engineering

## THE IMPORTANCE OF PHASE IN WORD RECOGNITION

Jeffrey T. Pfeiffer  
Lieutenant, United States Navy  
B.S., The Pennsylvania State University, 1974

The use of phase-only representations of speech for isolated word recognition is explored. Until recently the ear was thought to be short-term phase insensitive. However, short-term phase-only reconstructed speech has been shown to retain much of the intelligibility of the original signal. Using capstral and analytic-signal processing techniques, a system for isolated word recognition is developed. The results of tests for both the speaker-dependent and speaker-independent case indicate that phase may be an important feature to consider in the development of word recognition systems.

Master of Science in  
Electrical Engineering  
September 1983

Advisor: S. Jauregui  
Department of  
Electrical Engineering

## INERTIAL NAVIGATION SYSTEMS AIDED BY G.P.S.

Constantinos Christou Saflianis  
Lieutenant, Hellenic Navy  
B.S., Naval Postgraduate School, 1981

The present work is a Kalman filter study, in indirect feedback configuration, for a proposed integrated inexpensive Inertial Navigation System/Global Positioning System (I.N.S./G.P.S.).

A one nautical mile per hour, local-level, two-accelerometer I.N.S. is used where the errors are represented by a 7 state linear model.

G.P.S. is assumed to provide four range measurements from an equal number of satellites with the best relative position among those in view.

I.N.S. error analysis showed error dependence on Schuler frequency and that it was possible to neglect Foucault modulation for navigation purposes.

The present I.N.S./G.P.S. system has been showed to be quite effective since the navigation errors are reduced quickly for both short and long term periods without any divergence.

Master of Science in  
Electrical Engineering  
December 1982

Advisor: D. Collins  
Department of  
Aeronautics

Master of Science in  
Engineering Science  
December 1982

H. Titus  
Department of  
Electrical Engineering

## A LAYERED COMMUNICATION SYSTEM FOR ETHERNET

Mark Donald Stotzer  
Captain, United States Marine Corps  
B.S., University of Louisville, 1977

Connecting heterogenous computer systems via local area networks presents a challenge to software designers for the development of effective, reliable, and modifiable network communication software.

This thesis presents a set of hierarchical program modules written for use on any INTELLEC MDS microcomputer development system, running the CP/M-80 operating system, to allow the system to become part of an Ethernet local area network. These program modules were written to not only obey the principles of software engineering, but to also reflect the same functional hierarchy as the International Standards Organization Open System Interconnection (ISO OSI) architectural reference model for computer networks.

Master of Science in  
Electrical Engineering  
September, 1982

Advisor: U. R. Kodres  
Department of  
Computer Science

A USER'S MANUAL FOR INTERACTIVE LINEAR  
CONTROL PROGRAMS ON IBM/3033

Robert M. Thompson  
Lieutenant, United States Navy  
B.S., University of Kentucky, 1975

There existed a need for an interactive program that would provide the user assistance in solving applications of linear control theory. The Linear Control Program (LINCON) and its user's guide satisfy this need. A series of ten interactive programs are presented which permit the user to carry out analysis, design and simulation of a broad class of linear control problems.

LINCON consists of two groups: matrix manipulation, transfer function and time response programs; and modern controls programs. Examples for each are worked within each terminal session section.

Master of Science in  
Electrical Engineering  
December 1982

Advisor: H. A. Titus  
Department of  
Electrical Engineering

ELECTROMAGNETIC NEAR-FIELD COMPUTATIONS  
FOR A BROADCAST MONOPOLE USING  
NUMERICAL ELECTROMAGNETICS CODE (NEC)

David Duer Thomson  
Lieutenant Commander, United States Navy  
B.S.E.E., University of Washington, 1971

An often ignored aspect of electromagnetic radiation from antennas is the characterization of their near-fields. A computer program, Numerical Electromagnetics Code (NEC), is validated for accurate near-field computations and applied to a model of a broadcast monopole. E- and H-fields are plotted as a function of position along the antenna for various distances from the surface. The fields are also plotted as a function of radial distance outward for various heights.

Master of Science in  
Electrical Engineering  
September 1983

Advisor: S. Jauregui  
Department of  
Electrical Engineering



A TIME SLOT ASSIGNMENT ALGORITHM FOR  
A TDMA PACKET RADIO NETWORK

William Karl Tritchler  
Captain, United States Marine Corps  
B.S., University of Wisconsin, 1975

An algorithm for the assignment of time slots within a Time Division Multiple Access (TDMA) scheme for an integrated voice and data packet radio network is implemented in, and studied by, a computer simulation. The slot assignment scheme is applied both to a static network, where "best path" routes are held constant, and also to a network where the "best path" routes are permitted to change dynamically during the simulation as communications capability at various nodes approaches saturation.

The Dijkstra algorithm is used to determine and modify "shortest distance" routes, and the sensitivity of performance to various parameters used in defining the link "distance function" is investigated. The major conclusion is that it is possible to route in a way that reduces the average energy transmitted per message without substantially decreasing the network throughput.

Master of Science in  
Electrical Engineering  
March 1983

Advisor: J. M. Wozencraft  
Department of  
Electrical Engineering

**MASTER OF SCIENCE**  
**IN**  
**ENGINEERING ACOUSTICS**

## COMPUTERIZED MEASUREMENT AND TRACKING OF ACOUSTICAL RESONANCES

Donald Vincent Conte  
Lieutenant, United States Navy  
B.S., University of Washington, 1975

A system is described which incorporated a Hewlett-Packard 85 "desktop" computer to control a frequency synthesizer and read the output of a lock-in analyzer to measure, display and record the resonant frequencies, amplitudes, and quality factors for several modes of an acoustical resonator. The system is capable of locating, measuring, and tracking the resonant modes as parameters which affect sound speed and attenuation are varied. An algorithm for rapidly fitting "good quality" measured data to a resonance lineshape is described which determines quality factors to precisions of better than 0.01 percent and center frequencies to better than 0.1ppm. Sample output is provided for the lowest three plane wave modes of an air filled cylindrical resonator in the temperature range of -15 to 25 degrees Celsius.

Master of Science in  
Engineering Acoustics  
December 1982

Advisor: S. L. Garrett  
Department of  
Physics

Master of Science in  
Electrical Engineering  
December 1982

ANALYSIS OF ACOUSTIC AMBIENT NOISE IN  
MONTEREY BAY, CALIFORNIA

Christopher Jacob Elles  
Lieutenant Commander, United States Navy  
B.S., Baldwin-Wallace College, 1971

Magnetic tape recordings, made in 1980 and 1981 by previous investigators using sonobouys, of acoustic ambient noise in the south-eastern parts of Monterey Bay for various stations under various surf conditions, were analyzed. A computer program was developed and used with sonobouy calibration data to correct "raw-data" to absolute sound pressure levels. The variation of omnidirectional levels with range from the beach as a function of surf condition was investigated over a frequency range of 10-2500 Hz. Discussions of methods used during data-taking and analysis, the computer program itself, and typical data for certain surf conditons are reported. Some tentative conclusions are drawn from the results and presented. Comparison of one-third octave band levels indicate that the highest low-frequency levels exist for "heavy" surf conditions, especially for the band at 500 Hz, with levels decreasing in strength with increasing range from shore. These results are consistent with conclusions reached by the earlier investigators that significant contributions to ambient noise are made by sources in the surf zone.

Master of Science in  
Engineering Acoustics  
December 1982

Advisor: O. B. Wilson, Jr.  
Department of  
Physics

COMPUTERIZED MEASUREMENT, DISPLAY AND ANALYSIS OF SONAR  
TRANSDUCER EQUIVALENT CIRCUIT PARAMETERS

Leslie J. Skowronek  
Lieutenant Commander, United States Navy  
B.A., University of Colorado, 1972

Certain measurements of the electrical and mechanical properties of transducers are of importance to designers. These can be determined from accurate complex admittance and impedance measurements made throughout the frequency range of interest. Manual collection of needed data is a time-consuming process that is prone to error. The computerized system herein described substantially reduces the time requirement and produces more accurate output than can be obtained utilizing manual methods. In addition to a general discussion of equivalent circuits and the instruments employed, this report includes samples of plots and calculated parameters for piezoelectric and magnetostrictive transducers, the experimental comparison with traditional manual methods and the program listing for two versions of the system allowing varying amounts of operator options.

Master of Science in  
Engineering Acoustics  
December 1982

Advisor: S. L. Garrett  
Department of  
Physics

**MASTER OF SCIENCE**  
**IN**  
**ENGINEERING SCIENCE**

CHARACTERIZATION OF THE STRUCTURE AND SUBSTRUCTURE OF THERMALLY  
TRANSFORMATION CYCLED Cu-Zn-Al SHAPE MEMORY ALLOYS

Paul W. Bobowiec  
Lieutenant, United States Navy  
B.A., Boston University, 1974

Samples of a Cu-Zn-Al shape memory alloy were thermally cycled up to 100 times, using a differential scanning calorimeter, between the parent and martensite phases. The trends of transformation temperature versus number of cycles were correlated with observed microstructure. Specimens were examined through transmission electron microscopy techniques. The character of lattice defects and residual structures in the parent phase provided an understanding of substructural conditions enhancing martensite formation and reversion.

Master of Science in  
Engineering Science  
June 1983

Advisor: J. Perkins  
Department of  
Mechanical Engineering

## CASCADE COMPENSATION FOR SYSTEMS WITH MECHANICAL RESONANCES

Sozon A. Constandoulakis  
Lieutenant, Hellenic Navy  
B.S., Naval Postgraduate School, 1982

This thesis presents two methods of compensation for control systems including mechanical resonances. The first method is the use of a filter including pure imaginary zeros and complex poles and the second method is a filter using only complex poles. One basic model has been used to develop the methods.

Master of Science in  
Engineering Science  
December 1982

Advisor: G. J. Thaler  
Department of  
Electrical Engineering



A SYSTEM ANALYSIS AND DESIGN FOR UPDATING THE INTERNAL TRACKING  
OF THE QUALITY DEFICIENCY REPORTING SYSTEM AT THE  
NAVY'S FLEET MATERIAL SUPPORT OFFICE

Michael D. Carriger  
Captain, United States Marine Corps  
B.A., University of Washington, 1977

This study provides the needed cost/benefit analysis, utilizing a standard systems analysis, to update the tracking of the Quality Deficiency Reporting System at the Navy's Fleet Material Support Office, Mechanicsburg, Pennsylvania.

This thesis analyzes the present system, proposes an alternative manual process, establishes an interim Management Information System, and an analysis and proposal for an automated system using the concept of a local area network.

Master of Science in  
Information Systems  
June 1983

Advisor: N. Lyons  
Department of  
Administrative Sciences

## MICROCOMPUTER NETWORKING: A CP/M-BASED APPLICATION

Thomas M. Carnahan  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1971

Michael K. Waters  
Lieutenant, United States Navy  
B.S., Oregon State University, 1977

This thesis examines a topology and protocol for interconnection of microcomputers to allow them to communicate with each other. An application is offered based on the CP/M operating system and other industry standards. A low-cost hardwired implementation for connecting microcomputers is provided with software to allow file transfers. The implementation was developed by redesigning and assimilating existing software utilizing modern software engineering techniques.

Master of Science in  
Information Systems  
September 1983

Advisor: G. E. Latta  
Department of  
Mathematics

SOFTWARE REQUIREMENTS SPECIFICATIONS OF A PROPOSED  
PLANT PROPERTY MANAGEMENT SYSTEM

Edward J. Buselt  
Lieutenant, Supply Corps, United States Navy  
B.S., University of Kansas, 1974

The current system used to administer Plant Account equipment for academic departments at the Naval Postgraduate School involves four categories of system users and accountability for more than 2000 individual equipment items worth over seven million dollars. Implementation of a management information system (MIS) to support Plant Account equipment related functions could eliminate data handling redundancy and improve Plant Account administration effectiveness. This paper is a continuation of the thesis by James B. Carter, Jr., LCDR, USN entitled "Software requirements Specification of a Proposed Plant Property Management Information System for the Naval Postgraduate School". It presents the description and functional specification for the data base required to support the present Plant Account system. Additionally, it provides the requirements and file description for a prototype management information system to be used as a starting point from which to mechanize the present Naval Postgraduate School Plant Account procedures and files.

Master of Science in  
Information Systems  
June 1983

Advisor: R. W. Modes  
Department of  
Computer Science

## WORD PROCESSING AT THE NAVAL POSTGRADUATE SCHOOL

Richard E. Brooks  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1974

Gerard B. Baigis  
Captain, United States Marine Corps  
B.S., University of Pittsburgh, 1977

In spite of current technological advances in office automation technology little productivity gains have been made in the office environment. Some possible reasons for this are; lack of supervision, little or improper training, disregard for the human factor in equipment and work design and lack of clear organizational goals with regard to productivity gains. The purpose of this study is to explore the productivity aspect of word processing. An examination of selected productivity studies is presented with a look at the costs and benefits associated with the use of word processing equipment versus conventional electric typewriters. An examination of the science of ergonomics is presented as it deals with the physical and mental aspects of work processing equipment and its effects on the word processing equipment operator. The results of a survey of word processing equipment operators attitudes toward their job at the Naval Postgraduate School are presented along with conclusions and recommendations concerning the implementation of a humane and productive system.

Master of Science in  
Information Systems  
December 1982

Advisor: N. Lyons  
Department of  
Administrative Sciences

OPTIMUM ADP SUPPORT FOR FINANCIAL MANAGEMENT  
OF MARINE CORPS FACILITIES MAINTENANCE

Floyd D. Braaten  
Major, United States Marine Corps  
B.A., Western Washington State College, 1970

This thesis examines the internal information management needs of a Marine Corps Facilities Maintenance Department. The processing of information, and its associated work flow and reports, is discussed. The Facilities Maintenance Department is viewed as a Fund Administrator and the information flow is tied to fiscal management. The conclusion reached is that current processes are heavily dependent on manual systems. These manual systems are considered inadequate for efficient management of funds and work progress. Trend information and historical data is difficult to retrieve and managerial feedback is incomplete and untimely. Recommendations are made for modernizing these systems using internal ADP support and interfacing the internal system with Marine Corps-wide systems such as SABRS.

Master of Science in  
Information Systems  
June 1983

Advisor: J. F. Mullane  
Department of  
Administrative Sciences

## DOD/DON REQUIREMENTS FOR COMPUTER RISK ASSESSMENTS

Margaret A. Black  
Lieutenant, United States Navy  
B.A., Bucknell University, 1975

Martin F. Doherty  
Lieutenant, United States Navy  
B.A., Holy Cross College, 1976

The current methodology for conducting computer Risk Assessments within the Department of the Navy is examined by studying the theories and philosophies that have evolved from the perspective of the Federal Government. A review of the Navy's attitude and procedures for both contractual assistance and in-house approaches to conducting risk Assessments is presented, along with a general framework for conducting an assessment of the computer systems at the Naval Postgraduate School. Attention is then focused on the relative merits of automated and manual Risk Assessment methods, followed by an outline of proposed design specifications for a decision support system.

Master of Science in  
Information Systems  
June 1983

Advisor: N. Lyons  
Department of  
Administrative Sciences

INTEGRATION CONSIDERATIONS FOR THE STOCK POINT LOGISTICS INTEGRATED  
COMMUNICATIONS ENVIRONMENT (SPLICE) LOCAL AREA NETWORK

Kathleen M. Barrett  
Lieutenant Commander, United States Navy  
B.A., Immaculata College, 1972

This thesis examines the various functional modules that have been designed in support of the Stock Point Logistics Integrated communications Environment (SPLICE) local computer network. Initially, the overall design methodology is presented, followed by a description of the functional modules, their proposed capabilities and their relationships to each other. Finally, an analysis is made to determine how well the modules fit together to form an operational local computer network and to support both inter- and intra- network communications.

Master of Science in  
Information Systems  
December 1982

Advisor: N. F. Schneidewind  
Department of  
Administrative Sciences

LOCAL AREA NETWORK TERMINAL MANAGEMENT IN SUPPORT OF STOCK POINT  
LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE)

Jerry D. Barnes  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Oregon State University, 1969

This thesis examines the questions of user requirements, design considerations, and network environment for a local area network Terminal Management function in support of the Naval Supply Systems Command's Stock Point Logistics Integrated Communications Environment (SPLICE). Criteria are developed from this examination. They include process-process communication, virtual terminal, and user defined screen capabilities as well as a negotiated virtual terminal protocol based upon a network virtual terminal concept. Recommended generic and specific models of the Terminal Management function applying these criteria are then presented.

Master of Science in  
Information Systems  
December 1982

Advisor: N. F. Schneidewind  
Department of  
Administrative Sciences



## AN INFORMATION SYSTEM FOR KOREAN MILITARY PERSONNEL MANAGEMENT

Gwang U. Bak  
Lieutenant Colonel, Korean Air Force  
B.S., Korean Air Force Academy, 1968

Chong Hun Kim  
Major, Korean Army  
B.S., Korean Military Academy, 1972  
B.E., Yon Sei University, 1976

A personnel information system is designed for the management of Korean military officer personnel. The objective of this thesis is to apply the computer-based personnel information system in the area of military officer personnel management. Personnel systems of the Korean military are defined, and input/output requirements of the system are stated. A data base for the personnel system requirement is formulated. A personnel information system for the Korean military officer personnel management is developed. The processing of the system is described and flow charts of the system are included. Impacts which are caused by the computer-based personnel information system in Korean military are discussed.

Master of Science in  
Information Systems  
December 1982

Advisor: N. R. Lyons  
Department of  
Administrative Sciences

A SIMULATION STUDY OF ORGANIZATIONAL DECISION MAKING  
UNDER CONDITIONS OF UNCERTAINTY AND AMBIGUITY

Arthur J. Athens  
Captain, United States Marine Corps  
B.S., United States Naval Academy, 1978

The usual frameworks applied to the analysis of military decision making describe the decision process according to the rational model. The assumptions inherent in this model, however, are not consistent with the reality of warfare's inherent uncertainty and complexity.

A better model is needed to address the ambiguity actually confronting the combat commander. The "garbage can" model of organizational choice, a nonrational approach to decision making, provides insight into how the elements of an organization interact under problematic conditions.

A system simulation associated with the garbage can framework was adapted to model certain aspects of complex decision situations, providing a foundation for studying attention mechanisms like triggering, deadlines, and structural adaptations. The results and implications of this research apply not only to the military, but also to business and political organizations, as they too must often confront these conditions of uncertainty and complexity.

Master of Science in  
Information Systems  
June 1983

Advisor: R. Weissinger-Baylon  
Department of  
Administrative Sciences

**MASTER OF SCIENCE**  
**IN**  
**INFORMATION SYSTEMS**

BANK-TO-TURN CRUISE MISSILE TERMINAL GUIDANCE  
AND CONTROL LAW COMPARISON

Kent B. Watterson  
Lieutenant Commander, United States Navy  
B.S., Findlay College, 1969

This work consists of the development of the six degree of freedom nonlinear model of a sea launched generic bank-to-turn cruise missile attacking a medium sized combatant ship. Two guidance and control schemes are compared in the terminal phase. The first, or baseline guidance scheme (pop out maneuver), uses a 50-foot altitude hold for an ingress phase, followed by a pop out maneuver, and then an attack phase which uses proportional navigation in elevation and azimuth planes along with bank-to-turn maneuvering. The second scheme (sea skimmer) uses identical ingress and attack phases but eliminates the pop out maneuver. Miss distances for both schemes are compared while varying missile role rate limit, ECM blinking frequency, and burn through ranges.

Master of Science in  
Engineering Science  
June 1983

Advisor: M. D. Hewett  
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Aeronautics

AN INTEGRATED DESIGN SPECIFICATION FOR THE HARPOON SHIPBOARD  
COMMAND-LAUNCH CONTROL SET (HSCLCS), AN/SWG-1A(V)

Orville Lawrence Sentman  
Lieutenant Commander, United States Navy  
B.S.A.E., Purdue University, 1971

Randall Keith Maroney  
Lieutenant, United States Navy  
B.S., University of Texas, 1974

The Block 1C version of the surface launched HARPOON cruise missile has performance capabilities that cannot be used due to the limitations imposed by the HARPOON Shipboard Command-Launch Control Set (HSCLCS). This thesis is an initial effort to redesign the HSCLCS from the software engineering approach. The HSCLCS system specifications are derived from stated U.S. Navy's requirements and additional features proposed by the authors. The HSCLCS software design is completed in detail through the system definition. Development of the software design continues through the use of system data flow diagrams and their subsequent mapping into the preliminary system software structure. First iteration data structure definitions and functional module descriptions are provided.

Master of Science in  
Engineering Science  
December 1982

Advisor: R. Modes  
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Computer Science

EXPANSION OF THE SCAN ENDGAME PROGRAM FOR AIRCRAFT SURVIVABILITY  
AND DEVELOPMENT OF A SUPPORTING USER'S GUIDE

Jean Paul Fourny  
Captain, Canadian Armed Forces  
B.S.C., Royal Military College, 1973

This study involved a detailed examination of the aircraft survivability analysis program called SCAN and modification of the pre and post-processing graphics programs that support the program. The aim was the improvement of the originally installed version of SCAN at NPS by incorporating the graphics commands for the new IBM supported terminals, by increasing the speed of the display process, and by simplifying the input data preparation by making it more interactive. In addition, a comprehensive User's Guide was prepared for use by NPS students involved in aircraft survivability/warhead lethality studies.

Master of Science in  
Engineering Science  
December 1982

Advisor: R. E. Ball  
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Aeronautics

SOFTWARE REQUIREMENTS SPECIFICATION OF A PROPOSED  
PLANT PROPERTY MANAGEMENT INFORMATION SYSTEM  
FOR THE NAVAL POSTGRADUATE SCHOOL

James B. Carter, Jr.  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

The current system used to administer Plant Account equipment for academic departments at the Naval Postgraduate School involves four categories of system users and accountability for more than 2000 individual equipment items worth over seven million dollars. Implementation of a management information system (MIS) to support Plant Account equipment related functions could eliminate data handling redundancy and improve Plant Account administration effectiveness. This paper presents an analysis and a logical functional specification of the present Plant Account system. Additionally, it proposes a software requirements specification independent of any physical system implementation. This specification could be used in designing an MIS to support administration of Plant Account equipment at the Naval Postgraduate School.

Master of Science in  
Information Systems  
December 1982

Advisor: R. W. Modes  
Department of  
Computer Science

## A COST-PERFORMANCE ANALYSIS OF COMPUTER ALTERNATIVES

Gladys Twining Connolly  
Lieutenant, United States Navy  
B.A., University of Colorado, 1977

This study contains an application of cost-performance analysis to the automation of a manual reporting and record-keeping system. A small local transit company serves as the basis for the analysis. Beginning with a brief history of small business computing and computers in the transit industry, it covers the main aspects of requirements analysis in terms of system size, software and hardware. Four alternative computer systems, two minicomputers and two microcomputer networks, are presented and rated on their responsiveness to the transit company's needs. Tradeoffs in cost and performance are analyzed to determine the marginal costs for each unit of increase in performance. The cost-performance techniques developed for mainframe systems are shown to be applicable to minicomputer and microcomputer based systems as well.

Master of Science in  
Information Systems  
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Advisor: C. R. Jones  
Department of  
Administrative Sciences



UNIQUE CONSIDERATIONS IN THE DESIGN OF A COMMAND AND CONTROL  
DECISION SUPPORT SYSTEM

Candace Lee Conwell  
Lieutenant, United States Navy  
B.S., New Mexico State University, 1976

Decision Support Systems (DSS) have been identified as a solution to the military commander's needs for information filtering and analysis. Current literature on the theory and techniques of DSS design have been addressed to the decision-making processes of commercial application. The lack of a comprehensive treatment of military command and control decision-making requirements may result in a number of command and control DSS which are not designed for the reliability and flexibility required in a context of everchanging threats. This thesis is an initial attempt to identify some unique considerations for the design of a command and control decision support system and offers suggestions towards the development of flexible, reliable systems to serve commanders in both peacetime and combat operations.

Master of Science in  
Information Systems  
June 1983

Advisor: R. Weissinger-Baylon  
Department of  
Administrative Sciences

# A PRODUCTIVITY ANALYSIS OF NONPROCEDURAL LANGUAGES

Mimi Corcoran  
Lieutenant, United States Navy  
B.S., Pennsylvania State University, 1972

Denham B. MacMillan  
Lieutenant, United States Navy  
B.A., University of South Carolina, 1974

The emergence of so-called "nonprocedural" language promises the elimination of many of the problems encountered in managing information systems, as well as increasing productivity, by offering a flexible, easy to learn, user friendly language to interact with the host language. This thesis investigates nonprocedural languages in general, with particular attention paid to the languages FOCUS and RAMIS II, in order to ascertain the benefits and drawbacks of these languages, assess the fulfillment of vendor claims, examine their investment viability, and explore user satisfaction.

Master of Science in  
Information Systems  
December 1982

Advisor: N. R. Lyons  
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Administrative Sciences

AN ORGANIZATION DESIGN FOR THE PERSPAY  
CONSOLIDATED DATA CENTER

Norman H. Crane  
Lieutenant Commander, United States Navy  
B.A., Marietta College, 1972

The PERSPAY Consolidated Data Center (CDC) is to be a large data processing activity used by both the Navy Finance Center, Cleveland, and the Naval Military Personnel Command, Washington, D.C. The CDC is to be located in Cleveland and operated by NFC.

This thesis develops an organization design and the beginnings of a transition plan for the CDC. The organization design concepts of Jay R. Galbraith are used to analyze NFC's current Data Processing Department. These concepts are then used to develop an organizational structure and a system for communication and coordination within the CDC and between the CDC and its users.

Master of Science in  
Information Systems  
June 1983

Advisor: R. H. Weissinger-Baylon  
Department of  
Administrative Sciences

A MANAGEMENT INFORMATION SYSTEM FOR THE PURCHASING  
ACTIVITY AT THE NAVAL POSTGRADUATE SCHOOL

Victor E. Cunningham  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., University of Kentucky, 1970

This thesis addresses the initial development stages of an automated Management Information System (MIS) for use by the purchasing activity at the Naval Postgraduate School. It initially examines the policies, practices, procedures and processing techniques employed in the non-automated environment, and identifies key elements of interest which can be captured through automated techniques to improve the level of management information available. A system to capture, edit, input and store this information is discussed, and an extensive analysis of the necessary output reports is offered. The thesis concludes by sizing the physical requirements of the system and making specific recommendations regarding generic hardware requirements.

Master of Science in  
Information Systems  
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Advisor: N. Lyons  
Department of  
Administrative Sciences

MANAGEMENT PRINCIPLES TO BE CONSIDERED FOR IMPLEMENTING A DATA  
BASE MANAGEMENT SYSTEM ABOARD U.S. NAVAL SHIPS UNDER  
THE SHIPBOARD NON-TACTICAL ADP PROGRAM

Robert Harrison Dixon  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The increased administrative burden being placed upon the Fleet increasingly affects ship performance and personnel morale and retention. The Shipboard Non-tactical ADP Program (SNAP) is being instituted in order to alleviate these burdens. However, the "applications approach" being used with SNAP is not sufficient to meet both the functional and management needs of the Fleet. The management environment necessary to satisfy both of these needs are discussed. The central theme is that of centralization and standardization of data, its definition, and its control. Fundamental to the above philosophy is the concept of Information Resource Management (IRM). Automation of IRM should be done via a Data Base Management System (DBMS). The critical tool required to transfer IRM results to a DBMS is the Data Dictionary System (DDS). Additionally, two crucial management positions, the IRM manager and the Data Base Administrator (DBA), are essential to the success of this "data base approach."

Master of Science in  
Information Systems  
December 1982

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Administrative Sciences

## MICROCOMPUTER MICROECONOMICS

Mark A. Doernhoefer  
Lieutenant, United States Navy  
B.A., University of Missouri, 1976

This paper outlines the procedures for an economic analysis of a microcomputer system designed for personal use. It provides a methodology for application identification and quantification of the benefits derived from the applications. Empirical decision rules are suggested for the key decisions of quantity and mix of software, start-up and cessation timing, and resource allocation. These rules are based upon analysis of marginal opportunities gained and foregone over the lifecycle of the system. Particular emphasis is placed upon the role of software in the economics of the system. Economies of scale and sensitivity analysis are also discussed. The thesis serves as a structured beginning for further research into microcomputer system modelling.

Master of Science in  
Information Systems  
December 1982

Advisor: D. C. Boger  
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Administrative Sciences

## OFFICE AUTOMATION: A LOOK BEYOND WORD PROCESSING

Milan Ephriam DuBois, Jr.  
Captain, United States Marine Corps  
B.S., The Citadel, 1977

Word processing was the first of various forms of office automation technologies to gain widespread acceptance and usability in the business world. For many, it remains the only form of office automation technology. Office automation, however, is not just word processing, although it does include the function of facilitating and manipulating text. In reality, office automation is not one innovation, or one office system, or one technology, but rather it is the integration of a broad set of office system, information processing and communications technologies. Office automation encompasses a wide span of applications which will be examined individually as well as collectively. Additionally, this thesis will take a cursory look at the problems of implementing an automated office and the possible impact it can have on human office workers. The purpose of this thesis is thus to provide a capsulated examination of what office automation is, what it consists of, what applications are available, and how it can be implemented.

Master of Science in  
Information Systems  
June 1983

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Administrative Sciences

U.S. COAST GUARD ALTERNATIVES FOR DISTRIBUTED  
DATA BASE MANAGEMENT SYSTEMS

Edward Mark Fiegel  
Lieutenant, United States Coast Guard  
B.S., Lowell Technological Institute, 1970

Stephen H. Goetchius  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1977

The United States Coast Guard is a relatively small federal agency tasked with a number of duties. Its multi-mission nature and low budget is driving the Coast Guard to realize better use of its resources. A pivotal factor in this goal is the investment in the information systems architecture of the future, today. Within the information architecture, data base technology plays an important role. It is to be employed in major operational and administrative systems, as well as in the future Coast Guard District Minicomputer Procurement. The purpose of this thesis is to examine the alternatives available to the U.S. Coast Guard for implementing data base technology.

Master of Science in  
Information Systems  
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Administrative Sciences



A SURVEY OF SOFTWARE QUALITY ASSURANCE METHODS AND AN  
EVALUATION OF SOFTWARE QUALITY ASSURANCE AT FLEET  
MATERIAL SUPPORT OFFICE

Michael Fugua  
Lieutenant, United States Navy  
B.S., Utah State University, 1974

Julius Sisco  
Lieutenant, United States Navy  
B.S., Iowa State University, 1976

James Conroy  
Lieutenant Commander, United States Navy  
B.S., Kearney State College, 1971

This paper is a survey of existing literature describing software quality assurance functions and the Fleet Material Support Office (FMSO) Quality Assurance Division. Quality control at FMSO is effected by the organizational element that produces the product and by a small, centralized staff. Improved systems development and a higher level of quality control are the goals of FMSO. The recommendations and conclusions offered are based on an extensive literature search of existing material on software quality assurance, an indepth study of selected industry quality assurance departments, and an examination of the current state of quality control procedures at FMSO. These recommendations, if implemented, should serve to improve the quality control at FMSO and assist the organization in achieving their goals.

Master of Science in  
Information Systems  
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Administrative Sciences

THE DETERMINATION OF USER INFORMATION REQUIREMENTS DURING THE  
DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEMS

Paul Richard Gardella, Jr.  
Lieutenant, United States Navy  
B.S., Villanova University, 1978

One of the major causes for the failure of Management Information Systems (MIS) is that they do not satisfy the users' information requirements. This, in turn, is most often caused by the fact that those requirements are difficult to obtain accurately and completely. Simply "asking" the user what he needs is inadequate. This thesis reviews the Information Requirements Analysis (IRA) literature, briefly describing some of the techniques available for determining the user's information requirements. It then reports on a survey which attempted to investigate the degree to which the extensive MIS literature involving information requirements determination has had practical impact on the way in which MIS's are actually developed.

Master of Science in  
Information Systems  
June 1983

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A SIMULATION OF INFORMATION LOAD AND ITS  
AFFECT ON TACTICAL DECISION MAKING

Christopher C. Hassler  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1978

This thesis examines the problems associated with the abundance of information generated by decision aids, and utilizes James G. March's model of organizational decision making as a medium to examine information. The emphasis is on choice situations resulting in "flight", "oversight", and "resolution" conditions and how the related provisions of information load prejudice the above-mentioned conditions. The foundation and the resultant perspective of this thesis is predicated upon a survey of over fifty government funded studies on decision making, tactical decision aids, tactical information requirements analysis, modeling criteria, organizational behavior, and the influences they have on choice outcomes.

The intent of this research is to provide a more realistic depiction of information usage by simulating the effects of various levels of information load on the choice process. This study recognizes information load as a condition which affects Naval tactical decision processes and hence has applicability, at least by association, to TDSS (Tactical Decision Support Systems) design.

Master of Science in  
Information Systems  
June 1983

Advisor: R. H. Weissinger-Baylon  
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Administrative Sciences

## COMPUTER SECURITY FOR THE COMPUTER SYSTEMS MANAGER

William D. Helling  
Major, United States Marine Corps  
B.S., University of West Florida, 1977

This thesis is a primer on the subject of computer security. It is written for the use of computer systems managers and addresses basic concepts of computer security and risk analysis. An example of the techniques employed by a typical military data processing center is included in the form of the written results of an actual on-site survey. Computer security is defined in the context of its scope and an analysis is made of those laws and regulations which direct the application of security measures into Automatic Data Processing systems. Finally, a list of some of the major threats to computer security and the countermeasures typically employed to combat those threats is presented.

Master of Science in  
Information Systems  
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Administrative Sciences

SOFTWARE DEVELOPMENT PROJECTS: ESTIMATION OF COST  
AND EFFORT (A MANAGER'S DIGEST)

Charles James Pierce, Jr.  
Lieutenant, United States Navy  
B.A., Queens College of The City University of New York, 1971

Rebecca Louise Wagner  
Lieutenant, United States Navy  
B.A., Bemidji State University, 1977

This research focuses on the principles upon which models have been, and may be, constructed for estimating cost and effort in software development projects. A definition of and factors influencing software engineering economics is presented. The major phases and activities of the software lifecycle are described. Effort, time and cost estimation is analyzed. A presentation is then given of some widely used models for estimating cost and effort. Critical factors which must be considered when constructing a model for estimating cost and effort in software development projects are then presented. We summarize by citing areas that require more attention if cost and effort estimates are to be further improved.

Master of Science in  
Information Systems  
December 1982

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## NETWORK MANAGEMENT OF THE SPLICE COMPUTER NETWORK

Craig E. Opel  
Captain, United States Marine Corps  
B.S., United States Naval Academy, 1976

This thesis examines the network management functions required for a local computer network. Initially, general management considerations are addressed. These include: problem determination, performance analysis, problem management, change management, configuration management, and operations management. The sidestream, mainstream, centralized, decentralized, and hybrid network monitoring technologies are then discussed. An investigation of network measurement tools and their use in generating management reports is undertaken. The topics of analysis timing, performance measure utilization, and parameter selection are considered. Procedures for detecting, diagnosing and correcting network component failures are presented. Solutions are proposed for problems associated with managing a local computer network-long haul network interface. Finally, a discussion of the mission, objectives, and responsibilities of a local computer network central monitoring site is undertaken.

Master of Science in  
Information Systems  
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Advisor: N. F. Schneidewind  
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Administrative Sciences

A DESIGN METHODOLOGY FOR EMBEDDED WEAPONS SYSTEMS USING THE  
HARPOON SHIPBOARD COMMAND-LAUNCH CONTROL SET (HSCLCS),  
AN/SWG-1A(V)

Daniel P. Olivier  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

Kevin R. Olsen  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1978

This thesis demonstrates a structured approach to software development for a complex weapons system. The project is the redesign of the Weapons Console Indicator Panel (WCIP) for the Harpoon Shipboard Command Launch Control Set (HSCLCS). A methodology is presented which takes the design from the requirements analysis phase, through data flow diagrams and transform analysis, up to the actual design in a System Design Language (SDL).

Master of Science in  
Information Systems  
June 1983

Advisor: R. Modes  
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Computer Science

DEVELOPMENT OF THE COMPUTER SYSTEMS MANAGEMENT INSTRUCTIONAL  
LABORATORY AT THE NAVAL POSTGRADUATE SCHOOL

Kenneth J. Mills  
Lieutenant, United States Navy  
B.S., University of New Mexico, 1976

Jesse M. Richards  
Commander, United States Navy  
B.A., University of Virginia, 1967

Glen F. Tilley  
Lieutenant, United States Navy  
B.S., University of Washington, 1977

The ability to converse effectively with technicians has been recognized as a critical skill for managers of data processing activities. This need has been addressed by the Association for Computing Machinery in their recommended curricula for the education of Information Systems specialists. Members of the Association have also described the functions of a graduate of those curricula to be that of a boundary spanner and a change agent. Other authors have identified that these skills need to be gained in practical environments, and that the manager needs to know at least a minimum of the technical language in order to select good technicians for his staff, and to communicate with that staff effectively. At the Naval Postgraduate School a course of instruction in technical aspects of the computer was designed into a newly constructed microcomputer laboratory. This thesis is the report of the evolution of that laboratory and course of instruction.

Master of Science in  
Information Systems  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Administrative Sciences



## USE OF COMPUTERS IN NAVAL MOBILE CONSTRUCTION BATTALIONS

Donald J. MacKinnon  
Commander, Civil Engineer Corps, United States Navy  
B.S., California State College at Chico, 1966

This paper reviews the use of the PDP 11/03s in the Naval Mobile Construction Battalions. The existing system was evaluated against the information requirements of the battalions and recommendations are proposed for hardware and software improvements and for the implementation of the new system.

The existing system was found to be incomplete and inadequate in terms of both hardware and software. Information systems used in the private construction industry, while useful, will not satisfy all the requirements for a battalion. It is recommended that a new system be designed utilizing networking techniques and incorporating a data base management system.

Master of Science in  
Information Systems  
December 1982

Advisor: N. R. Lyons  
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Administrative Sciences

## THE EVOLUTION OF THE INFORMATION SYSTEMS MANAGER

Thomas M. Machak  
Lieutenant, United States Navy  
B.S., North Carolina State University, 1975

This study examines personality and biographical data gathered from a representative sample of Information Systems Managers in an attempt to determine if these managers are more like their subordinates or their peers. A group of thirty-seven subjects employed in high-level computer related positions completed a survey designed to measure Murray's Variables of Personality and a biodata questionnaire. The findings were compared to published results from similiar studies conducted on computer programmers and systems analysts and on other managers.

The research shows that, in terms of Murray's Variables of Personality, the study group of Information Systems Managers had more in common with other managers than they did with programmers and systems analysts. Additionally, based on the results of the biodata gathered, these men shared a feeling of self-confidence and a positive outlook for the future with other members of the management profession.

Master of Science in  
Information Systems  
December 1982

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Administrative Sciences

## VESSEL TRAFFIC SERVICES

William Daniel Lynch  
Lieutenant Commander, United States Navy  
B.A., Columbia University, 1971

This paper will examine the historical impetus for Vessel Traffic System (VTS) development in the United States. Cost benefit techniques utilized to establish the VTS requirements are discussed and the data base upon which the analysis is conducted is critiqued. General Accounting Office criticism of the Coast Guard's VTS development process are analyzed. Finally VTS is examined as a single component in the improvement of port logistics, which must be arrayed against other alternatives to make the most effective use of scarce resources. This final element is discussed with respect to the Federal government's attempt to recover clearly allocatable costs in the form of user fees.

Master of Science in  
Information Systems  
December 1982

Advisor: N. Lyons  
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Administrative Sciences

## THE NAVAL DATA AUTOMATION COMMAND: A CASE STUDY

Nancy A. Lambert  
Lieutenant, United States Navy  
B.A., The College of William and Mary in Virginia, 1977

The paper contains an examination of the Naval Data Automation Command (NAVDAC) and the ramifications of the lack of long range planning upon NAVDAC. Four perspectives are taken, examining the effect upon NAVDAC's creation, mission, structure, and control systems. The position held by the author is that because no long range plan existed the Navy:

- . Created an ADP command designed to correct the problems of the past rather than implement future requirements.
- . A discrepancy arose between NAVDAC's domain and mission, resulting in the pursuance of a modified mission.
- . The centralized functional organization of NAVDAC reflects this mission.
- . No defined control systems exist against which to objectively evaluate NAVDAC.

Master of Science in  
Information Systems  
December 1982

Advisor: C. R. Jones  
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Administrative Sciences

## THE SOFTWARE ENGINEERING PROTOTYPE

Michael R. Kirchner  
B.S., Illinois Benedictine College, 1973

Experience has shown that the traditional method of software development often has poor results. Recently, a new approach to software development, the prototype approach, has been proposed. This thesis presents an integrated view of general design theories and relates that view to software design and development. The current thought on prototypes is described and the basic requirements for a software engineering environment are presented. Software prototypes are shown to support the integrated view of design. Four case studies of using prototypes are presented and recommendations for further study are made.

Master of Science in  
Information Systems  
June 1983

Advisor: G. C. Howell  
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Administrative Sciences

A GUIDELINE FOR THE PLANNING AND SYSTEM REQUIREMENT DETERMINATION  
OF A COMPUTER BASED EDUCATIONAL SYSTEM

Harry Wayne Johnson  
Lieutenant, United States Navy  
B.B.A., University of Iowa, 1972

The objective of this thesis research was to create a guideline that can be followed to plan and determine the system requirements of a computer based educational system. The principle users of this report will be those commands that may not have personnel trained in computer management but desire to investigate the possibility of augmenting or replacing current traditional educational methods.

Current advancements in computer technology and production processes have made even the smallest of commands potential users of the computer to ensure more effective and efficient personnel training and education. Computer Based Education (CBE) is at the forefront of this advancing technology of computers and possesses the potential to improve individual learning rates and comprehension, but only if the proper system is developed. Guidance for CBE system development is presented in this thesis.

Master of Science in  
Information Systems  
June 1983

Advisor: J. R. Hayes  
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Administrative Sciences

TECHNICAL AND ECONOMIC ANALYSIS OF PLANNED VISUAL DISPLAY TERMINAL  
EMPLOYMENT FOR THE STOCK POINT LOGISTICS INTEGRATED  
COMMUNICATIONS ENVIRONMENT (SPLICE)

Samuel E. James  
Major, United States Marine Corps  
B.S., University of Tampa, 1977

The Stock Point Logistics Integrated Communications Environment (SPLICE) concept is designed to augment the existing Navy Stock Point and Inventory Control Point ADP facilities, in response to increasing demands for data processing, within the scope of a decentralized telecommunications environment. This thesis provides a critical review of the existing plan for employment of Visual Display Terminals (VDTs) within the SPLICE concept. VDT employment considerations are examined and alternative VDT employment options are presented. A technical and economic analysis is performed for both the planned and proposed alternative VDT equipment and employment options. Recommendations based on these findings are then presented.

Master of Science in  
Information Systems  
June 1983

Advisor: N. F. Schneidewind  
Department of  
Administrative Sciences

A STUDY OF PROGRAMMER PRODUCTIVITY METRICS FOR  
FLEET MATERIAL SUPPORT OFFICE (FMSO)

Gary Jack Hughes  
Lieutenant Commander, United States Navy  
B.A., Pacific University, 1972

The demand for software programs is increasing at an ever faster pace than supply. As a result, software has become the most expensive part of a computer system's life cycle costs. Accordingly, software development efficiency has become a major managerial concern. This paper discusses the software development process within the context of the production function. It presents a comparison of various productivity models that are currently being discussed in the literature and a test of selected models. This paper is part of a group of papers which together provide recommendations to the Fleet Material Support Office (FMSO) to enhance its software development organization.

Master of Science in  
Information Systems  
June 1983

Advisor: D. Boger  
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Administrative Sciences



## AMPHIBIOUS OPERATION SIMULATION

Chanok Hongnoi  
Lieutenant, Royal Thai Navy  
B.S., Thai Naval Academy, 1974

Since the price of personal computers is coming down, it is possible to have computers in a small ship that has a limited budget. The commanding officer of a small ship needs a support systems for making decisions in amphibious operations. A personal computer would be helpful in saving time manipulation the information used to make decisions in amphibious operations.

The area to be investigated is the approach to the systems analysis and design of the amphibious operation controller and simulation program in ship-to-shore phase. We use the computer to control the waves of small boats that carry the troops to shore.

Master of Science in  
Information Systems  
December 1982

Advisor: N. Lyons  
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Administrative Sciences

## DISASTER PLANNING FOR NAVY ADP SYSTEMS

John Randall Hickman  
Lieutenant, United States Navy  
B.S.E., University of Pennsylvania, 1978

ADP systems have become vital to many Navy activities and thus have created a need for disaster planning which will ensure the continued operation of these systems. However, disaster planning is expensive, long-drawn, and difficult to implement under day-to-day operational commitments.

This study analyzes the directives governing Navy ADP disaster planning, presents affordable alternatives, and suggests the need for a Navy support team to assist in the implementation of disaster plans.

Master of Science in  
Information Systems  
June 1983

Advisor: J. R. Hayes  
Department of  
Administrative Sciences

ORGANIZATIONAL STRUCTURE CONSIDERATIONS  
FOR SOFTWARE DEVELOPMENT PROJECTS

Kevin M. Quinn  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

Organizational structure has long been recognized as having an important impact on an organization's ability to accomplish its objectives. This paper provides managers of software development projects with an analysis of the importance of several elements of organizational structure, and of how they can use this knowledge to make decisions which will have a positive impact on the success of their projects. The structural elements discussed are specialization of activities, size of the work group, and standardization of activities.

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Advisor: N. Lyons  
Department of  
Administrative Sciences

NARDAC CIVILIAN DP TRAINING: A NEED  
FOR MANAGEMENT ATTENTION

David J. Santoro  
Commander, United States Navy  
B.S., United States Naval Academy, 1967

Much has been written within the past few years concerning ways to improve morale, productivity and retention of persons in the data processing profession. The computer industry has been particularly vulnerable to problems in these areas because of rapid growth in terms of size and technology. The result has been high turnover rates in its work force. The Navy employs a substantial number of civilian data processors in its ADP community and there is no reason to believe that the Naval ADP manager is immune to encountering the same problems.

This paper looks at the value of an in-house training program as a possible solution to these problems by showing why it may be an important source of intrinsic satisfaction to the employee. Attitudes in civilian industry are first discussed. A Naval ADP facility is examined for comparison purposes, its civilian employees surveyed to determine preceived effectiveness of the command's training program. The importance of adequately budgeting for training is established affirmatively.

Master of Science in  
Information Systems  
December 1982

Advisor: R. T. Harris  
Department of  
Administrative Sciences

AN ANALYSIS OF THE COMPUTER SYSTEM CHARGEBACK CONCEPT IN  
THE NAVAL INDUSTRIAL FUND ENVIRONMENT

Terry D. Schechinger  
Lieutenant Commander, United States Naval Reserve  
B.A., University of Iowa, 1968

Arthur E. Prack, III  
Lieutenant, United States Navy  
B.S., Purdue University, 1976

The Navy Regional Data Automation Centers (NARDACS) are to become Navy Industrial Funded (NIF) activities on 1 October 1983. This requires that NARDACS bill customers for all data processing services and this requires the development and implementation of a computer chargeback system whereby the NARDACS are reimbursed by users for the cost of DP services provided. As with any new program, there are many unresolved issues. The potential consequences of the change to NIF accounting and the issues of chargeback approach, costs, benefits, goals and objectives are evaluated and addressed within the context of the defined control structure. The purpose of this thesis is to evaluate the potential usefulness of the system, provide an insight into potential pitfalls, present background information, propose an implementation plan to assist in setting up a chargeback system and discuss methods to minimize disruption generated by the introduction of a chargeback system.

Master of Science in  
Information Systems  
June 1983

Advisor: C. R. Jones  
Department of  
Administrative Sciences

A STUDY OF QUANTITATIVE MEASUREMENTS OF PROGRAMMER PRODUCTIVITY  
FOR FLEET MATERIAL SUPPORT OFFICE (FMSO)

Daniel John Spooner  
Lieutenant, United States Navy  
B.S., Pennsylvania State University, 1977

The demand for software products has grown, but the number of quality programmers has not kept pace. Therefore, programmer productivity has become a major area of discussion throughout the software development industry. This paper examines the various measures discussed in the literature and used in selected corporations which develop software. It presents several methods for measuring programmer productivity. Included in the discussion are the salient points where managers must devote special attention if they are to use programmer productivity. Included in the discussion are the salient points where managers must devote special attention if they are to use programmer productivity measures effectively. This paper is part of a group of papers which together provide recommendations to the Fleet Material Support Office (FMSO) to enhance its software development organization.

Master of Science in  
Information Systems  
December 1982

Advisor: D. Boger  
Department of  
Administrative Sciences

SOFTWARE ENGINEERING PRACTICES: THEIR IMPACT ON THE  
DESIGN OF A PROGRAM MAINTENANCE MANUAL

James Howard Teuscher  
Lieutenant, United States Navy  
B.A., State University of New York, College at Oswego, 1975

The cost of software is fast becoming a major slice of DOD's automated data processing budget. Most of this cost is directly related to the maintenance of existing software. A primary cause is poor or non-existent documentation which leads to high costs when it comes time to change the software to correct errors, add enhancements, or to comply with changes in Federal regulations/DOD policies.

This thesis looks at the various software engineering techniques available to programmers and managers for the development of software documentation. A set of guidelines for an "ideal" program maintenance manual is proposed. These guidelines are based on current DoD standards, examples of software maintenance manuals from industry, and applications of current software engineering practices.

Master of Science in  
Information Systems  
December 1982

Advisor: R. Modes  
Department of  
Computer Science

MODEL STATEMENT LANGUAGE/ANALYZER (MSL/MSA): A TOP-DOWN PROBLEM  
STATEMENT LANGUAGE/ANALYZER (PSL/PSA) APPROACH FOR THE  
USER DIALOGUE IN DECISION SUPPORT SYSTEMS

John Joseph Troy  
Lieutenant, United States Navy  
B.S., Marquette University, 1977

This thesis examines the concept of a top-down approach to providing natural language interface and more simple and flexible model manipulation for users of decision support systems, through the use of a model statement language/model statement analyzer (MSL/MSA). Patterned after problem statement language/problem statement analyzer (PSL/PSA), the MSL/MSA is a software tool which interprets user input and assists the user through iterative and interactive heuristic problem-solving searches through levels and categories of models, functions, and equations.

Master of Science in  
Information Systems  
June 1983

Advisor: D. R. Dolk  
Department of  
Administrative Sciences



## KNOWLEDGE MANAGEMENT FOR MODEL MANAGEMENT SYSTEMS

George William Watson, Jr.  
Lieutenant, United States Marine Corps  
B.A., University of Washington, 1978  
M.B.A., California State University, 1981

This study examines the issues involved in bringing qualitative and quantitative techniques to bear upon unstructured managerial decisions. Furthermore, this work reviews the problems of user interfaces and data base interfaces as they relate to aspects of model base management.

The focus of this study is to identify some organizations of knowledge about models within a Decision Support System. In support of this goal, this report investigates what knowledge is, how it is structured, and how it is accessed.

Master of Science in  
Information Systems  
June 1983

Advisor: D. D. Dolk  
Department of  
Administrative Sciences

EVALUATOR BIAS IN THE MARINE CORPS COMBAT READINESS EVALUATION  
SYSTEM (MCCRES): ITS IDENTIFICATION AND CONTROL

George M. Wheeler  
Captain, United States Marine Corps  
B.S.A.E., United States Naval Academy, 1976

The Marine Corps Combat Readiness Evaluation System (MCCRES) was designed to provide timely and accurate information concerning the ability of active and reserve forces to carry out assigned combat missions. To provide this information, units are subjected to simulated combat problems and their performance is observed by expert evaluators from within the Marine Corps. Though these evaluators are considered experts in their fields, they may inject bias into their evaluations causing an inaccurate combat readiness rating for the unit observed.

Analysis of the MCCRES reveals three main areas where evaluator bias may appear: senior evaluator influence, other evaluator bias and interpretation of the mission performance standards used to conduct the evaluation. To alleviate these problems, three actions are explored: evaluator training, evaluator testing and quantification of the mission performance standards.

Master of Science in  
Information Systems  
June 1983

Advisors: K. J. Euske  
J. F. Mullane  
Department of  
Administrative Sciences

## UTILIZATION OF ADA AS A PROGRAM DESIGN LANGUAGE

George J. Wylie  
Lieutenant Commander, United States Navy  
B.A., University of Washington, 1971

Thomas R. Watt  
Lieutenant, United States Navy  
B.A., Syracuse University, 1973

In terms of manpower, time and money, the single largest investment that must be made in the acquisition and maintenance of a large and complex computer system is the investment made in software. In response to this situation, the DOD began an intensive and comprehensive research and development effort in an attempt to reduce, if not eliminate the inherent problems associated with software system design. The end result of this effort was the creation of the Ada programming language. This thesis will examine the development of the language, focusing attention on the concepts and features which make Ada a potential "software crisis" solution. These concepts and features will be further examined as to the extent to which they support the utilization of Ada as a program design language (PDL).

Master of Science in  
Information Systems  
June 1983

Advisor: R. Modes  
Department of  
Computer Science

A COMPUTER-BASED INFORMATION SYSTEM FOR THE ISSUE/RECEIPT CONTROL BRANCH,  
SUPPLY DEPARTMENT, NAVAL POSTGRADUATE SCHOOL

Thaddeus F. Zychowski  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., College of William and Mary, 1969

The Supply Department of the Naval Postgraduate School is a relatively small department of the school; however, through its material acquisition function, it provides an extremely valuable service to the command in the form of material and logistic support. There are several functional areas that provide support to the material acquisition process. The purpose of this thesis is to examine these functional areas for possible utilization of a computer-based management information system which would improve the effectiveness of those processes performed within each functional area. The thesis will describe the support functions as they are presently performed and review any internal or external influences on these functions, followed by a proposed computer-based information system, its accompanying data-base, and a prototype system.

Master of Science in  
Information Systems  
December 1982

Advisor: N. R. Lyons  
Department of  
Administrative Sciences

**MASTER OF SCIENCE**  
**IN**  
**MANAGEMENT**

THE COST GROWTH PROBLEM: A REALISTIC  
DIAGNOSIS AND SOLUTION

Robert David Aaron, P.E.  
B.S.M.E., University of Maryland, 1975

The problem of cost growth of major systems acquisitions has long been an important concern within the Department of Defense (DOD) and Congress. A brief review of acquisition history from the 40's to the present shows little success in controlling it. With so many unsuccessful past changes to the organization and processes, the cost growth problem begs for a new approach. A review of the static principles of organizational design reveals several inconsistencies when compared to the DOD structure. The science of organizational development (OD) is discussed and recommended as a solution.

Master of Science in  
Management  
June 1983

Advisor: J. W. Creighton  
Department of  
Administrative Sciences

DELEGATION: A COMPETENCY OF SUPERIOR PERFORMERS?

Gary K. Abe  
Captain, United States Army  
B.A., Loyola University, 1976

William T. Babylon  
Captain, United States Army  
B.S.B.A., Bucknell University, 1973

The Navy with its historical and present emphasis on developing subordinates through increased responsibility and authority, can not afford leadership training which is ineffective. The research developed in this study seeks to provide information on one management tactic, delegation. The study is based upon the competency model developed by McBer for the Navy's Leadership Management Education and Training (LMET) program.

A review of the historical thought on delegation from the classical to the neoclassical writers is presented. Also discussed is the background on the development of LMET.

The research was conducted utilizing the techniques originated by McBer in their study for the Navy. This thesis sought to find if the specific competency of delegation is more often demonstrated by superior Navy personnel and if LMET training has any significant impact upon managerial effectiveness and the use of delegation.

The results of the study found no significant relationship between delegation, managerial effectiveness, and LMET training.

Master of Science in  
Management  
December 1982

Advisors: R. A. McGonigal  
W. R. Bishop  
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Administrative Sciences

A CRITIQUE OF NAVSTAR GLOBAL POSITIONING SYSTEM, USER EQUIPMENT,  
CONFIGURATION CONTROL FOR DOD COMMON AND NAVY UNIQUE ITEMS

Thomas D. Abrahamson  
Lieutenant, United States Navy  
B.S., Marquette University, 1978

Gerard M. Mauer, Jr.  
Lieutenant, United States Navy  
B.S., Villanova University, 1976

The User Equipment (UE) Global Positioning System (GPS) Configuration Control structures, procedures and information system up to March 1983 is critiqued. Our objective was to explore the existing configuration management plans in terms of documentation, with specific emphasis on the feasibility of the configuration control plans for the Navy unique and DoD common items. Our conclusion is that the GPS Configuration Control Structure is fundamentally sound. However, a major problem of integrating the various facets of configuration control management exists. To correct this deficiency, the GPS Program must now obtain interservice and intraservice written agreements of Configuration Control Responsibility to further specify and clarify each service's Configuration Control boundaries.

Master of Science in  
Management  
June 1983

Advisor: W. H. Cullin  
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Administrative Sciences



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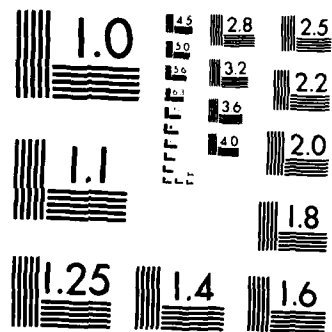
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

DISTRIBUTION OF BUDGETED OUTLAYS WITH REGARD TO THE  
AVAILABILITY OF FUNDS IN THE DOD BUDGET

John P. Anderson  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1978

This thesis examines the performance of four major appropriations categories within the Department of Defense budget for the period FY55 - FY84. By performing descriptive data analysis on budgeted outlays for the period under study, it was determined that the availability of funds in DOD affect different kinds of appropriations differently. Analysis of the data was based on each category's budget shares, growth rates, and percentages of the annual DOD increment. Executive budget outcomes appeared to include non-incremental adjustments and that these adjustments are primarily in procurement and research, development, test and evaluation categories. The category with the most consistent success in competing for funds has been research, development, test and evaluation and a strong trade-off relationship appeared between this category and procurement.

Master of Science in  
Management  
June 1983

Advisor: P. Bromiley  
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Administrative Sciences

MULTI-PERIOD REPAIR PARTS INVENTORY MODEL  
FOR A NAVAL AIR REWORK FACILITY

Andre S. Asselin  
Commander, Supply Corps, United States Navy  
B.S., College of the Holy Cross, 1969

A Ready Supply Store (RSS) containing repair parts which are anticipated to be used during the production process has been established to support the Naval Air Rework Facility (NARF). While this supporting inventory has previously been constructed using historical demand data, a single-period model and a two-period model have been proposed which compute stock levels based on quarterly production schedules. This thesis extends the use of the projected production information in calculating RSS inventory levels from two periods to multiple periods. The disadvantage of the single-period model is that it ignores information about future schedules. The multi-period model uses the information on future schedules to behave more optimally. The multi-period model shows significant differences in inventory levels over the single-period model as a result of the added information. The multi-period model is also easily programmed on a computer and is preferred over the single-period model.

Master of Science in  
Management  
September 1983

Advisor: A. W. McMasters  
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Administrative Sciences

TECHNOLOGY TRANSFER: A COMPILATION OF VARIED APPROACHES  
TO THE MANAGEMENT OF INNOVATION

Claudia Lynn Bailey  
Lieutenant Commander, United States Navy  
B.A., University of Illinois, 1969

Today's managers often find themselves at a loss when trying to deal with the vast amount of technology and innovative information available to them; they do not know how to actively implement technological innovation. The manager who desires to learn about the effective management of technological innovation and change is faced with sources too numerous and diverse to be readily accessed and integrated. A single reference is needed.

A review and analysis of the available transfer of technology data was conducted to identify those concepts, approaches and techniques that will be of assistance to managers who must recognize, evaluate and implement the technological advances within their organizations. This thesis provides a compilation of pertinent selected works on technology transfer and addresses the foundations of technology transfer; the elements of the Predictive Technology Transfer Model; applications of technology transfer; and the associated public policy issues.

Master of Science in  
Management  
December 1982

Advisor: J. W. Creighton  
Department of  
Administrative Sciences

A GUIDE FOR DEVELOPING AN ADP SECURITY PLAN FOR  
NAVY FINANCE CENTER, CLEVELAND, OHIO

Daniel E. Barber  
Captain, United States Marine Corps  
B.B., Western Illinois University, 1971

Elwood Thomas Hodnett, Jr.  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Virginia Polytechnic Institute & State University, 1972

This paper is intended to be used as a guide by personnel at the Navy Finance Center (NFC), Cleveland, Ohio in developing an Automatic Data Processing (ADP) Security Plan. An Effort has been made to combine the requirements for an ADP security plan established by OPNAVINST 5239.1A with pertinent information from other selected readings.

The importance of the devotion of personnel, time and funds to ADP security planning has been emphasized. Individual chapters have been devoted to the elements that *must be considered when developing an ADP security plan*. They include risk assessment, physical security, systems security, contingency planning and the managerial procedures necessary for the implementation of an ADP security plan.

This paper, used in conjunction with OPNAVINST 5239.1A, should provide ample guidance for the development of an initial ADP security plan for NFC, Cleveland.

Master of Science in  
Management  
December 1982

Advisors: D. C. Boger  
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Administrative Sciences

AN INVESTIGATION INTO THE LEVEL OF COMPENSATION  
IN THE AEROSPACE INDUSTRY

Frederick Joseph Becker, Jr.  
Commander, United States Navy  
B.S., Boston College, 1965

This thesis makes extensive use of archival data in the public sector to ascertain and compare the level of wages and compensation among industries, concentrating on the aerospace industry in particular. The segments which comprise the industry are analyzed extensively and trends noted and discussed. A review of factors found by the Bureau of Labor Statistics to influence pay in domestic manufacturing is included and the applicability of these factors to the aerospace industry is examined where possible. Some theoretical concepts of wages are discussed in order to provide a perspective from which to review the findings of fact and to provide a most useful construct with which to pursue further investigation.

Master of Science in  
Management  
June 1983

Advisor: D. C. Boger  
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Administrative Sciences

PROBLEMS ASSOCIATED WITH THE IMPLEMENTATION OF  
MANAGEMENT CONTROL SYSTEMS

James M. Bell  
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B.S., Oregon State University, 1977

The objective of the study is to determine if the Navy is following sound implementation procedures when a new system is introduced into the organization. Case studies are employed to determine what problems occur in a specific implementation process and whether or not the problems which did appear could have been avoided by an improved implementation process. This objective is accomplished through a comparison of theoretical models of change and implementation procedures employed by the Navy in the case studies. The conclusion of the Navy does have a sound process for implementing change in its management control systems and that the implementation process is used.

Master of Science in  
Management  
December 1982

Advisors: K. J. Euske  
P. W. Blondin  
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Administrative Sciences



# MANAGEMENT CONTROL SYSTEMS IN NOT-FOR-PROFIT ORGANIZATIONS: A CASE STUDY

Jay R. Benecka  
Commander, United States Navy  
B.S., University of Missouri, 1967

Thomas K. Quigley  
Lieutenant Commander, United States Navy  
B.A., Moorhead State University, 1971

Management control has been defined as "the process by which management assures that an organization carries out its strategies effectively and efficiently." Rapidly rising costs evidenced over the past decade have resulted in increased emphasis on these qualities in all organizations, particularly those in the public sector of similar nonprofit, service-oriented organizations where management controls have historically been lacking. This thesis investigates the requirement for and feasibility of developing a formal management control system in these organizations. The key traits, characteristics and standards important to management control are developed from a literature survey and contrasted against procedures identified in a field study as existing in a nonprofit organization. The authors conclude that a requirement for a formal management control system exists and make recommendations for implementing such a system utilizing tailored output measures and a program budget structure.

Master of Science in  
Management  
December 1982

Advisor: S. S. Liao  
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Administrative Sciences

ADMINISTRATIVE MANAGEMENT OF SMALL GROUP  
PHYSICIAN PRACTICE

Richard A. Blanchette  
Lieutenant, Medical Service Corps, United States Navy  
B.S., George Washington University, 1978

This study reviews the administrative structure and management of physician office practices composed of two, three, or four physicians. It reflects the findings of a questionnaire survey about the operation of their private offices. Such areas as conflict resolution methodology and the structure of the decision making process among equals are included as well as an examination of the traditional workload factors that may be useful in comparing the efficiency of the organizations. An examination of five organizations within the sample space was conducted to obtain a qualitative perception of the administrative management of the organizations studied. Interviews and non-reactive observations were employed to obtain a more definitive view of the normal interactions between the members within each organization. The study identifies five characteristics that are symptomatic of inefficient organizations. Nine guidelines are prescribed for physicians who desire to improve the efficiency of their practices.

Master of Science in  
Management  
December 1982

Advisors: J. D. Senger  
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Administrative Sciences

AN INVESTIGATION INTO ENLISTMENT STANDARDS FOR  
THE ELECTRONICS TECHNICIAN RATING

Rogers A. Bond  
Commander, United States Navy  
B.S., Golden Gate University, 1964

This thesis describes the structure and training pipeline of the Electronics Technician rating in the Navy. Through an analysis of a cohort of 6,309 Electronics Technicians who enlisted between 1 Sept 1976, and 31 Dec 1978, this thesis demonstrates significant differences between personnel who enlisted in Nuclear Field, Advanced Electronics Field and other enlistment programs available during this time period. Through the use of discriminate analysis, three models for predicting potential enlistment success are developed from measures such as the Armed Services Vocational Aptitude subtests, education, age, marital status, enlistment waivers, and months of participation in the Delayed Entry Program administered by the Navy Recruiting Command.

Master of Science in  
Management  
June 1983

Advisor: R. S. Elster  
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Administrative Sciences

## RESOURCES MANAGEMENT SYSTEM (RMS): AN OVERVIEW

Douglas E. Brandt  
Lieutenant Commander, Medical Service Corps, United States Navy  
B.A., Washington State University, 1971

This thesis provides a synopsis of the 'Resources Management System' (RMS) which is currently in use at many Navy shore activities. The information is presented in manual format so that it can be used as a guide to the Resources Management System. The manual provides insight into the background of RMS and provides a concise view of RMS operations at the local command level. The manual is focused at the local command level because the greatest number of RMS participants are at that level. The overview highlights relationships within the system and provides a view of the RMS reporting requirements.

Master of Science in  
Management  
December 1982

Advisors: P. W. Blondin  
K. J. Euske  
Department of  
Administrative Sciences

## COHESION: A NEW PERSPECTIVE

Daniel G. Braun  
Captain, United States Army  
B.S., United States Military Academy, 1973

Recently the U.S. Army has recognized the benefits to combat effectiveness and retention associated with building cohesion in small units and has established programs intended to build cohesion. These programs have focused on small units in the combat arms and rely primarily on building cohesion through increased continuity of the unit's personnel. Research has established the significance of homogeneity of work group members in the building of cohesion in groups. This research develops a generalized model for the development of work group cohesion through the introduction of hypotheses. Data was collected to validate the model from units stationed in the Republic of Korea which were felt to be in worst case conditions of low continuity and heterogeneity of personnel. This generalized model may be applicable to all types of units through the management of the variables associated with the hypotheses accepted as a result of the data analysis.

Master of Science in  
Management  
June 1983

Advisor: R. T. Harris  
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Administrative Sciences

AN ANALYSIS OF THE PROFITABILITY OF MAJOR  
DEFENSE AEROSPACE CONTRACTORS

David Francis Britt  
Lieutenant, United States Navy  
B.S., University of New Mexico, 1977

This study is a comparative analysis between the profitability of defense and commercial aerospace business. Corporate data including profit measures and the volume of defense business were collected for a 22 year period from 1961 to 1982. The methodology uses regression analysis with the percentage of defense business and the percentage of capacity utilization within the aerospace industry as the explanatory variables for profit. Finally, a brief analysis of risk is included to provide a framework within which to compare these profit levels. Briefly the findings indicate; that defense contracting has, on the average, been less profitable than commercial; that contractors earn more on defense contracts during periods of increased capacity utilization, and that defense contracting involves higher risk. The author concludes that government acquisition managers must be continuously aware of the implications of these findings for individual contractors as well as for the entire defense industrial base.

Master of Science in  
Management  
September 1983

Advisor: W. R. Greer, Jr.  
Department of  
Administrative Sciences

A DESCRIPTIVE ANALYSIS OF FIRST TERM  
ATTRITION FROM SHORE ACTIVITIES

Kathleen Wolf Dodge  
Lieutenant Commander, United States Navy  
B.S., Old Dominion University, 1971

This thesis investigates the type of duty assigned--sea or shore--at the point of separation for those non-prior-service (NPS) males who left the Navy before expiration of their initial enlistment contract, using a fiscal year's cohort of accessions drawn from the Navy Enlisted Tracking File (STF). Demographic and organizational attributes of cohort members are described, as well as characterizations of service and reasons for loss for those who left prematurely.

Previous research using situational variables suggested the possibility that initial assignment to shore duty after training might be a higher attrition risk than assignment to sea duty for NPS males. The data for this cohort indicate that the predominance of shore processing activities as separating commands obscure the question of whether a premature loss should be attributed to a sea or shore command, and that assumptions about initial assignment to shore duty based on the type-duty variable of the STF are suspect because of the probability that processing, holding, and corrections commands are included under the designation of shore commands.

Master of Science in  
Management  
March 1983

Advisor: R. S. Elster  
Department of  
Administrative Sciences

AN INVENTORY MODEL FOR MANAGEMENT OF U.S.  
COAST GUARD CLOTHING FACILITIES

Charles J. Dickens  
Lieutenant, United States Coast Guard  
B.S., George Mason University, 1975

The Commandant of the Coast Guard, Admiral James S. Gracey, is concerned with providing adequate support of uniform items to Coastguardsmen. He stated in his annual State of the Coast Guard Address on January 20, 1983 that he wants to solve these problems promptly.

This thesis proposes a periodic inventory model which will increase the effectiveness of inventory management of clothing facilities. The proposed model offers improvements by forecasting demand in order to minimize stock outages and by increasing customer satisfaction through increased service levels. The proposed inventory control model has been developed in two parts, one for forecasting recruit demands and the other for sales demands. While the first part of the inventory model is only applicable at the Cape May Training Center, the second can be used throughout the Coast Guard and is offered as a partial solution to the uniform support problems.

Master of Science in  
Management  
June 1983

Advisor: A. W. McMasters  
Department of  
Administrative Sciences



## PILOT SELECTION CRITERIA FOR THE AH-64 HELICOPTER

Richard Diamond  
Major, United States Army  
B.S., University of Albuquerque, 1975

This thesis uses statistical analysis methods and subjective decisions to determine the parameters necessary to establish crew selection criteria for the AH-64 attack helicopter. The purpose of establishing these parameters is to aid the Army in establishing pilot selection criteria for the AH-64.

The techniques of simple linear regression and nonparametric statistics indicated that the greater the experience level the better performance level achieved. The analysis of crews determined that less experienced crews performed proportionately as well as the more experienced crews. Curiously, the amount of experience of the pilot is not a determining factor, whereas the copilot gunners experience is directly related to how well the crew performed. Crew selection for the AH-64 helicopter should be made from the existing AH-1 series community of aviators with the more experienced aviators performing duties as copilot gunner.

Master of Science in  
Management  
December 1982

Advisor: J. W. Creighton  
Department of  
Administrative Sciences

A MANAGER'S GUIDE AND PROGRAM EVALUATION  
OF ARBITRATION IN THE FEDERAL SECTOR

James Clifton Davis, III  
Lieutenant Commander, United States Navy  
B.S., James Madison University, 1973

This thesis contains an information guide to, and an economic evaluation of arbitration in the public sector. The research has resulted in the description of legal relationships between compulsory arbitration and employee's and manager's rights. It describes procedures to follow in selecting an arbitrator and discusses how to prepare and present an arbitration case. The economic evaluation defines specific costs and benefits and evaluates the effect of arbitration on wage and benefits of public employees.

The conclusions provide managers with an evaluation of the strengths and weaknesses of arbitration in the federal sector and provide mid-level managers with a guide to the procedural steps up to and including the arbitration in the federal sector and provide mid-level managers with a guide to the procedural steps up to and including the arbitration process. Strengths include those benefits derived such as protection of employee interest, political and social stability, and inferred public and private wage parity. Weaknesses are the unmeasurable cost to the tax payer resulting from the allocating of scarce public resources by non-representative third party arbitrators. Recommendations are made for further cost benefit analysis on subjects relating to arbitration in the federal sector.

Master of Science in  
Management  
December 1982

Advisor: R. S. Elster  
Department of  
Administrative Sciences

COST ANALYSIS OF NAVY ACQUISITION ALTERNATIVES FOR THE  
NAVSTAR GLOBAL POSITIONING SYSTEM

Thomas F. Darcy  
Lieutenant Commander, United States Navy  
B.S., Florida State University, 1971

Gary P. Smith  
Lieutenant, United States Navy  
B.S., Auburn University, 1974

This research analyzes the life cycle cost (LCC) of the Navy's current and two hypothetical procurement alternatives for NAVSTAR Global Positioning System (GPS) user equipment. Cost are derived by the ARINC Research Corporation ACBEN cost estimating system. Data presentation is in a comparative format describing individual alternative LCC and differential costs between alternatives. Sensitivity analysis explores the impact receiver-processor unit (RPU) first unit production cost has on individual alternative LCC, as well as cost differentials between each alternative. Several benefits are discussed that might provide sufficient cost savings and/or system effectiveness improvements to warrant a procurement strategy other than the existing proposal.

Master of Science in  
Management  
December 1982

Advisor: D. C. Boger  
Department of  
Administrative Sciences

A MULTIVARIATE ANALYSIS OF NAVY FIRST TERM  
ENLISTED TURNOVER INTENTIONS

Sandra L. Cristensen  
Lieutenant Commander, United States Navy  
B.A., Kansas Wesleyan University, 1969

The purpose of this thesis was to develop and test a voluntary turnover model to examine reenlistment intentions among first term Navy enlistees within one year of expiration of active obligated service (EAOS). A multivariate regression analysis was used to examine the influences of various non-pecuniary and pecuniary explanatory variables on the linear and logistic form of intentions to reenlist. Demographic and tenure variables were not significant in the analysis results. A revised model was developed and the results indicated that specific job aspects relative to the perceived existence of alternatives and satisfaction with military life need to be identified with further empirical analysis in order to pursue appropriate effective policies.

Master of Science in  
Management  
March 1983

Advisor: G. W. Thomas  
Department of  
Administrative Sciences

ECONOMIC EFFECTS OF NOISE ABATEMENT REGULATIONS  
ON THE HELICOPTER INDUSTRY

Alexander N. Connar  
Lieutenant, United States Navy  
B.A., College of William and Mary, 1976

This thesis discusses the economic effects of noise abatement regulations on the helicopter industry. Increased manufacturing and operating cost from noise abatement regulations on Sikorsky's S-76 helicopter are estimated. The effects on consumer utilization are also discussed. An appendix compares two independent research studies that used weight estimating relationships and cost estimating relationships to estimate manufacturing costs of the helicopter by subsystem.

This thesis proposes that if noise abatement regulations are imposed on the helicopter industry without due consideration for future technological improvements, helicopter manufacturers, operators of helicopter businesses, and consumers of helicopter services would be adversely affected.

Master of Science in  
Management  
December 1982

Advisor: M. G. Sovereign  
Department of  
Administrative Sciences

# AN ANALYSIS OF CAPITALIZATION OF PROPERTY IN THE U.S. COAST GUARD

Thomas Ford Conlan  
Lieutenant, United States Coast Guard  
B.A., Tarkio College, 1977

This thesis studies the system used by the Coast Guard to capitalize property. Capitalization impacts upon both the physical accountability for property and the accuracy of financial records. The system for property capitalization and control is analyzed first by reviewing the accounting principles applicable to all Federal agencies. Implementation of the property accounting system is then evaluated through field research at the USCG Group Office, Monterey, California. After consideration of issues relevant to capitalization problems in current practice, improvements to the system are recommended.

This thesis concludes that, with proper implementation, the system will provide the required control. Recommendations are concerned with correcting the system's implementation problems.

Master of Science in  
Management  
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Advisor: J. M. Fremgen  
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Administrative Sciences

## THE METHODOLOGY OF COST ESTIMATION FOR U.S. MISSILES

Kyung Ho Choo  
Captain, Korean Army  
B.A., Korean Military Academy, 1975

Public data on U.S. missile systems are used to demonstrate the procedures and techniques for development of Cost Estimating Relationships (CER) by statistical methods. First, attention is given to data adjustment for constant dollars and quantities since the data come from yearly budget. Next, simple and multiple linear regressions are performed in various combinations of three explanatory variables (weight, speed and range). Learning curves are introduced to derive the reduction in cost as the number of items produced increases.

Master of Science in  
Management  
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Operations Research

AN EXAMINATION OF RECRUIT ATTRITION IN  
THE UNITED STATES MARINE CORPS

Charles Ross Carrigan  
Captain, United States Marine Corps  
B.S., University of North Carolina-Chapel Hill, 1971

Joseph Henric Franz  
Captain, United States Marine Corps  
B.S., Auburn University, 1976

Since 1979, the rate of recruit attrition in the United States Marine Corps has continued to increase. This increase in recruit attrition is costly in terms of both time and money.

The purpose of this thesis is threefold. First, it provides a general overview of the Marine Corps recruiting and training process. Second, it attempts to compare recruit attrition statistics between the two recruit depots. And third, it attempts to construct a profile of Senior Drill Instructors with low attrition rates and Senior Drill Instructors with high attrition rates.

As a result of the study, the authors present recommendations for future recruit attrition studies; a recommendation for the development of uniform definitions and reporting formats for the recruit depots; and finally, a recommendation that Congressional legislation be implemented which would allow military recruiters access to school and police records of potential recruits.

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Administrative Sciences





A MEASURE OF MAINTENANCE TRAINING AND QUALIFICATION READINESS  
AND ITS IMPACT ON BILLET LIFE CYCLE COST

James P. Butler  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

John D. Blankenship  
Lieutenant, United States Navy  
B.S., University of Mississippi, 1976

This thesis identifies a means of computing the dollar value loss from enlisted maintenance personnel training/qualification degradation. This was accomplished by reviewing existing manpower and training requirements, establishing a measure of Activity Maintenance Department Training/Qualification Effectiveness, and adjusting Billet Life Cycle Cost by the degree of training/qualification deviation. The precepts of this thesis have application beyond the aviation maintenance community.

Master of Science in  
Management  
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Advisor: R. D. Elster  
Department of  
Administrative Sciences

## MANAGEMENT CONTROL OF FLIGHT OPERATIONS (OFC-01) FUNDS

Robert N. Burton, Jr.  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

The objective of this thesis is to review the management control system of the United States Navy Flight Operations (OFC-01) funds at the Headquarters, Commander, Naval Air Forces, U.S. Pacific Fleet (CNAP). Data was collected from OFC-01 funds administrators, obtained through field visits and telephone interviews, and compared with Type Commander directives; and research on management control systems. Specific areas described in the research included the administration and flow of OFC-01 funds, the Budget OPTAR Report, and the Navy Flying Hour Program.

The conclusions contained in this thesis provide an evaluation of the strengths and weaknesses of the OFC-01 management control system. Strengths include a well developed information system, an established financial structure, and a strong structural organization. Weaknesses include a flow of funds that does not follow the operational chain of command and a lack of formal feedback from CNAP to the squadron level. Specific recommendations are provided to improve the management control of OFC-01 funds.

Master of Science in  
Management  
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Advisors: K. J. Euske  
J. F. Mullane  
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Administrative Sciences

AN ECONOMIC ANALYSIS OF MANPOWER ALTERNATIVES FOR THE  
NAVY DRUG DETECTOR DOG HANDLER FUNCTION

Mary P. Bruno  
Lieutenant Commander, United States Navy  
B.S., St. Bonaventure University, 1972

This thesis investigates the manpower alternatives for accomplishing the duties required of a Navy Drug Detector Dog (DDD) handler. The feasibility of substituting civil service or private sector contractor handlers for military handlers is examined to determine the least cost manpower alternative consistent with government requirements. Economic cost estimates for performing the DDD handler function are developed for each of the manpower alternatives. Manpower costs for the three alternatives are compared. Conclusions and recommendations concerning the staffing of DDD handler billets are provided.

Master of Science in  
Management  
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Administrative Sciences

AN EVALUATION PROGRAM FOR NONPROFIT  
RECREATION ORGANIZATIONS

Stephen B. Brooks  
Lieutenant Commander, United States Navy  
B.S., Bryant College, 1974

Increasing costs and declining resources have resulted in emphasis placed on evaluation and measurement of effectiveness and efficiency of Morale, Welfare, and Recreation organizations. This thesis addresses the requirement for evaluation, the construction of measures of output, effectiveness, and efficiency and the development of an evaluation program for nonprofit government organizations which support morale, welfare, and recreation. The research involves a review of the literature on management control, development of criteria and measures, and an on-site study of a recreation activity. The author concludes that an evaluation program is essential and makes recommendations for the use of output measures of effectiveness as well as measures of efficiency and financial viability that can be used by management.

Master of Science in  
Management  
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Advisor: J. M. Fremgen  
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Administrative Sciences

NAVAL CONSTRUCTION FORCE READINESS TRAINING, PEACETIME CONSTRUCTION  
AND THE WAR MISSION: A QUESTION OF CONGRUENCY

William A. Dos Santos  
Lieutenant, Civil Engineer Corps, United States Navy  
B.S., Cornell University, 1976

In the study, the author examines the congruency between Naval Construction Force (NCF) peacetime training and construction tasking policies and the war mission. Following an introduction of NCF organizational relations and NCF components, the author provides a brief history of the NCF. The NCF mission is identified by examining several key documents while training and construction tasking policies are abstracted from COMCBPAC/COMCBLANT/COMRNCF Instruction 1500.20E and OPNAV Instruction 5450.46G, respectively. The mission is redefined by the author in terms of "critical mission parameters" or constraints. The analysis then examines the degree of support contained in the policy documents for contraposing policies to the critical parameters. The analysis is conducted at two levels. The first level of analysis uses the content analysis technique to evaluate training and peacetime construction tasking policies at the policy source level. The second analysis examines the congruency of policies at the working level. The general conclusion is that current training and construction tasking policies are consistent with the war mission. The major deficiency noted is the lack of specific policy requiring that NCF units exercise routinely with supported commands. A second finding is that policy relative to cross-rate training appears to be selfcontradicting.

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Management  
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## RETENTION SEVERITY IN THE NAVY: A COMPOSITE INDEX

Michael A. Driggers, I  
Lieutenant, United States Navy  
B.A., University of North Carolina at Charlotte, 1975

The purpose of this thesis was to develop a Retention Severity Index (RSI) for 99 Navy enlisted ratings. The RSI model was developed from an analysis of factors relating to the Navy's demand for experienced personnel in each rating. The multiattribute RSI model is a composite index of five personnel components: (1) shortage, (2) growth, (3) size, (4) cost, and (5) priority. The RSI model generated an expression of the relative retention severity for each of the 99 occupations (ratings) for each of the Selective Renlistment zones (A, B, C). The intent of the RSI is to assist in the assignment of SRB bonus multiples.

Master of Science in  
Management  
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ROLE AMBIGUITY AND ROLE CONFLICT IN THE AREA  
OF INDIVIDUAL TACTICAL DEVELOPMENT

Francis K. Drogowski  
Lieutenant, United States Navy  
B.S., Western Michigan University, 1976

The Navy's primary mission is combat warfare in the defense of our country. To achieve this mission it is vital that Naval Officers in operational billets assigned to ships, submarines, aircraft squadrons, and afloat staffs maintain the highest degree of readiness and tactical expertise. Analysis of survey data obtained from Air Warfare Officers indicates the existence of Role Conflict and Role Ambiguity in the area of Individual Tactical Development. The results showed in particular, that Officers perceived differences in how they, their Commands, and the Navy evaluated the importance of Officer Tactical-skill Development.

Master of Science in  
Management  
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EXPERIMENTAL TRAINING: DOES IT MAKE A DIFFERENCE? A WORKSHOP FOR  
MILITARY SUPERVISORS CONCERNING THE DEPARTMENT OF  
THE ARMY GENERAL PERFORMANCE APPRAISAL SYSTEM

Rebecca S. Enck  
Captain (P), United States Army  
B.S.E., State University College at Cortland, 1967

Kenneth C. Robertson, Jr.  
Captain, United States Army  
B.A., Washington State University, 1974

The Army has developed and implemented the General Performance Appraisal System to comply with the Civil Service Reform Act of 1978. Training efforts, to date, have been only marginally successful in transferring the knowledge and skills required of supervisors to operate the new system and none of the training has been designed specifically for military supervisors of civilian employees.

This thesis contains a workshop which addresses the requirements and responsibilities of the new system. It is designed specifically for military supervisors of Army civilian employees. The workshop is based on experiential learning theory. It was validated and evaluated during two separate presentations to military personnel from the Defense Language Institute and Fort Ord. The specific measures utilized are discussed in detail in the thesis. The workshop was judged to be effective at increasing participants' understanding of the new system and enhancing their skills in developing performance standards, completing performance appraisals, and conducting performance counselling.

Master of Science in  
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FIRST TERMER DISILLUSIONMENT: ITS EFFECT ON  
ATTRITION IN THE UNITED STATES NAVY

James E. Etterman, Jr.  
Lieutenant, United States Navy  
B.S., University of New Mexico, 1977

This thesis uses four data sets to examine the relationships between the expectations of the U.S. Navy enlisted men and the apparent influence of their expectations on the attrition rate. The 1979 DOD Survey of Personnel Entering Military Service provided a statement of expectations from men who were about to join the Navy, but had yet to be exposed to any military life. The impact of military experience in relation to expectations was obtained from the 1978 DOD Survey of Officers and Enlisted Personnel. Here, feelings of experienced enlisted men were expressed on areas concerning expectations of and satisfaction with Navy life. A third data set provided data on the attrition rates of those personnel who were in the year group that had participated in both of the above mentioned surveys. The fourth data set came from personal interviews conducted at the U.S. Navy's Treasure Island Discharge Processing Center. The interviews allowed for a more in-depth understanding of enlisted expectations and their relationship to attrition from the U.S. Navy.

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Administrative Sciences

THE PRIOR SERVICE ACCESSIONS POOL: WHO ARE THEY  
AND HOW DO WE RECRUIT THEM?

LeVerne Perry Fernandez  
Lieutenant, United States Navy  
B.S., The Citadel, 1977

The purpose of this thesis is to explore the feasibility of using prior service personnel as a source for fulfilling manpower requirements in the military. This study focused on a male population between the ages of 19 and 35 who were either discharged from a service or reenlisted after broken service between 1 July 1975 and 30 September 1981. The size and quality of the available pool was established. The use of prior service accessions from 1975 to 1981 was analyzed. The study concludes with recommendations for research and changes in current prior service recruiting and utilization policies. Research to be conducted primarily in the area of skill degradation to investigate the validity of paygrade reductions based on the length of broken service. Policy changes would reflect the research findings, aggressively recruit prior service personnel and make the return to active duty an easier transition than it is today.

Master of Science in  
Management  
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Administrative Sciences

AN ANALYSIS OF NSC SAN DIEGO'S BROADWAY COMPOUND AND  
NATIONAL CITY ANNEX LOCAL DELIVERY SYSTEM

Larry E. Flohr  
Lieutenant Commander, United States Navy  
B.A., Lafayette College, Easton, PA., 1970

With the implementation of NISTARS and NAVADS which provide the Supply Centers with state-of-the-art automated warehousing, material handling, and document processing, the Navy has the real-time information and warehousing assets necessary for the development of an optimal local delivery distribution plan which will improve supply support to all Supply Center customers. Essential to the development of an optimal local delivery distribution plan is the development of an information base to use as a measurement standard. This study analyzes Naval Supply Center, San Diego's local delivery system with the intent of determining onload and offload times for unit pallet loads, driving transit times to each customer site, and the volume of material delivered. The results of this analysis may then serve as a data base for the development of a truck scheduling algorithm to optimize personnel and local delivery vehicle assets.

Master of Science in  
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Administrative Sciences

A MANAGEMENT INFORMATION SYSTEM FOR THE ANALYSIS OF THE  
ARMED SERVICES APTITUDE BATTERY

Robert Joseph Forman  
Captain, United States Army  
B.S., United States Military Academy, 1974

This thesis develops a management information system called ASVABMIS for use by Army agencies conducting analysis using data from the Armed Services Aptitude Battery. The thesis develops a FORTRAN program that inputs demographic data and raw scores, and computes subtest standard scores, and the Army Classification Battery Composites. The output is directed to files designed to be easily used with the Statistical Package for the Social Sciences for statistical analysis. In addition, a data base management system is integrated into the information system for data organization and management.

Master of Science in  
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Administrative Sciences

## DEATH AND GRIEF IN THE MILITARY: AN ATTITUDINAL FOCUS

Linda Jean Fraser  
Lieutenant, United States Navy  
B.A., University of South Florida, 1976

Little research has been undertaken with respect of people's attitudes on sudden death, even though a wealth of material on death and grief is now available. Given the potential lethal nature of the military profession, such studies are necessary.

A literature survey of death and grief was conducted addressing the traditional cultural attitudes of the United States, possible reasons for the recent popularity of death education, and a variety of factors that affect an individual's attitudes toward death.

A questionnaire reflecting a model by Dr. Elisabeth Kubler-Ross was developed to elicit attitudes toward death and dying from a military viewpoint. The sample was comprised of veterans of the Vietnam conflict.

The survey addresses the military member's feelings on death based on recent combat experience. Recommendations for further research are proposed as a result of this author's findings.

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Advisor: R. A. McGonigal  
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Administrative Sciences

THE WARRANTY GUARANTY CLAUSE: AN ANALYSIS OF ITS USE ON THE SPRUANCE  
CLASS (DD-963) SHIPBUILDING CONTRACT AND  
IDENTIFICATION OF LESSONS LEARNED

James T. Freihofer  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Southeast Missouri University, 1971

Daniel S. Beach  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

The extension of contractor liability beyond delivery is an essential element in contracting when complex weapons systems are involved. Warranty/Guaranty clauses are currently being included in shipbuilding contracts as a means of incentivizing contractors to provide quality workmanship and materials. The authors have investigated the results of one Warranty/Guaranty effort, the U.S. Navy's Spruance Class Shipbuilding Program, and constructed a Cost-Effectiveness Model to evaluate actual performance on three ships of that Class. Lessons learned are identified and presented which could be incorporated into future Warranty/Guaranty policy decisions.

Master of Science in  
Managment  
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Administrative Sciences

## REFUGEE OPERATIONS: CULTURES IN CONFLICT

Patrick E. Garren  
Major, United States Army  
B.B.A., University of Houston, 1970

Frank G. Helmick  
Captain, United States Army  
B.S., United States Military Academy, 1976

This thesis examines the 1980 Cuban refugee operation in which the United States military was an active participant. The purpose of this project was to examine the undesirable phenomena at the refugee centers and develop cultural indicators which may predict their occurrence.

Information was gathered from official records, periodicals, and personal interviews with a variety of participants. These interviews ranged from the refugees themselves, to the installation commanders. After action reports from both the Vietnamese and Cuban operation were reviewed in detail.

The results of this project clearly reveal that serious incidents occurred in all Cuban refugee centers. Cultural issues occurred in all Cuban refugee centers. Cultural issues surrounding the serious incidents were discussed and contributing factors developed. An examination of the contributing factors using cultural concepts was also presented.

Master of Science in  
Management  
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Advisors: R. A. McGonigal  
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Administrative Sciences

DECISION MODELS FOR CONDUCTING AN ECONOMIC ANALYSIS OF  
ALTERNATIVE FUELS FOR THE ICE ENGINE

Clifton F. Garrison, Jr.  
Lieutenant, United States Navy  
B.S., University of Washington, 1976

An economic analysis is made of vehicles powered by compressed natural gas (CNG), alcohol, and electric vehicles (VE's) as possible replacements for gasoline-powered vehicles. Advantages and disadvantages of vehicles powered by the various fuels are discussed and determinations of their suitability are made based on vehicle performance characteristics and fuel availability. CNG and EV's are determined to be viable alternatives based on current state-of-the-art technology. Alcohol is not retained as a viable alternative because of limited fuel availability. Models are presented for determining the total life cycle cost for gasoline, CNG, and EV's. A fleet of seventy-two vehicles at the Naval Postgraduate School is used as an example to compare the cost of each alternative. A linear program is used to determine the mix of gasoline, CNG, and electric vehicles that satisfy mission requirements for the least total fleet life cycle cost and to perform sensitivity analysis on the cost determinants. A generalized formulation is also presented to allow a vehicle fleet manager to use the methodology of this thesis as an aid to evaluating the potential of alternatively-fueled vehicles in different situations.

Master of Science in  
Management  
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## DEPRECIATION ACCOUNTING IN THE UNIFORM CHART OF ACCOUNTS

Charles Lee George  
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B.S., College of Charleston, 1978

This paper examines depreciation's contribution to the total cost of providing health care. In particular it analyzes the depreciation method used to measure the consumption of health care resources, the validity of the depreciation process and the subsequent allocation procedures. As defined by the Uniform Chart of Accounts, the usefulness of depreciation in determining the total cost of providing health care is attenuated by the fact that a major portion of a facility's capital assets are excluded from the depreciation process, the rate of depreciation understates the estimated useful service life of the assets, double counts certain expenses, and makes no provisions to periodically evaluate and adjust the composite rate of depreciation.

Comparisons are made between depreciation accounting in the military health service system and the civilian health care sector. Issues raised with the implementation of depreciation accounting within the Uniform Chart of Accounts are addressed and recommendations are made that may enhance the usefulness of the depreciation methodology.

Master of Science in  
Management  
December 1982

Advisor: S. S. Liao  
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Administrative Sciences

# THE SELECTION OF A MARINE ARTILLERY BATTERY FIRE DIRECTION COMPUTER SYSTEM

Paul Andrew Gido  
Major, United States Marine Corps  
B.S., Villanova University, 1972

The artillery fire direction systems currently used by the U.S. Marine Corps are inadequate to meet the demands of today's battlefield. The lack of a modern artillery fire direction computer system degrades the Marine Corps overall combat effectiveness.

This thesis presents a cost effectiveness analysis of four fire direction computer systems which can significantly enhance an artillery battery's combat effectiveness. An application of Multi-Attribute Utility Theory is used to determine a single measure of effectiveness.

As a result of the analysis, the author recommends the procurement of the Magnavox Artillery Computer System (ACS). The author further recommends that the ACS be adapted for use as a battalion level fire direction system on an interim basis until the introduction of MIFASS. Additionally, a number of recommendations which are representative of the types of action needed to assist in the resolution of the Marine artillery fire direction problem are provided.

Master of Science in  
Management  
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Advisors: D. C. Boger  
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COST-EFFECTIVENESS OF MANAGEMENT ACTIVITIES RELATED  
TO THE INTERACTION BETWEEN THE CALIFORNIA SEA  
LION AND THE SOUTHERN CALIFORNIA  
SHARK GILL-NET FISHERY

Terry D. Jackson  
Lieutenant, National Oceanic Atmospheric Association Corps  
B.A., University of California, Santa Barbara, 1973

The California Department of Fish and Game is presently considering a request to the Secretary of Commerce to regain management authority of the California sea lion because of mortalities and economic loss resulting from interactions with coastal fishermen. Before the request can be submitted various costs concerning State management have to be studied. This thesis addresses the cost and effectiveness of five activities relating to the interaction between the shark drift-gill-net fishery in Southern California and sea lions. The activities discussed are: assessing population levels, assessing incidental take, limiting the use of gill-nets by area and time of year, estimating the loss of fish and gear due to depredation, and estimating the value of an acoustical playback device. Where applicable, the cost and effectiveness of different alternatives within an activity are compared to provide criteria for evaluation. Each activity is examined from an economic perspective of what it might cost the state of gill-net-fishery if the activity were incorporated into an overall management plan of California sea lions.

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Management  
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Advisors: D. C. Boger  
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Administrative Sciences

REQUIREMENTS ANALYSIS AND SPECIFICATION METHODOLOGIES FOR  
EMBEDDED COMPUTER SYSTEMS: SURVEY AND CASE STUDY

Nicholas David Hunten Hammond  
Commander, Royal Australian Navy  
B.Sc. (Eng), University of London, 1967

While considerable advances have been made in the technology of software development, costs continue to rise. Research has shown that incomplete, ambiguous or inconsistent requirements specifications are a frequent cause of cost escalation and poor quality of the end product. This thesis reviews the problems in this area and their causes and examines a number of current systems and methodologies designed to better state the users' requirements. Techniques developed by the US Naval Research Laboratory for generating requirements specifications for embedded computer systems are selected for detailed examination and the results of a limited case study in the application of these techniques to a Navy weapon system are presented. These indicate that use of the techniques need not require a high degree of expertise in computer science and that they are adaptable to new systems.

Master of Science in  
Management  
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A TWO-PERIOD REPAIR PARTS INVENTORY MODEL  
FOR A NAVAL AIR REWORK FACILITY

John J. Hund  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., LeMoyne College, 1971

A Ready Supply Store (RSS) containing repair parts which are anticipated to be used during the production process has been established to support the Naval Air Rework Facility (NARF). While this supporting inventory has previously been constructed using historical demand data, a model which computes stock levels based on the next quarter's production schedule has been proposed. This thesis extends the use of projected production information in calculating RSS inventory levels from one to two periods, and compares the expected total costs from both systems under the assumption of a binominal demand distribution which is appropriate to a NARF. As a result of this comparison, the conclusion is made that the two-period model offers only very minor expected cost advantages over a single-period formulation, while also being much more difficult to utilize due to the complex calculations involved in the computation process.

Master of Science in  
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Advisor: A. W. McMasters  
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Administrative Sciences

## MERIT PAY: THE FEDERAL GOVERNMENT'S PAY-FOR-PERFORMANCE EXPERIENCE

Sherry Diane Holliman  
B.S., Colorado State University, 1972

For many years, businesses in private industry have been utilizing and experimenting with various forms of performance-based pay. These innovations have been part of a continuing search by organizations for better approaches to administering pay. With the passing of the Civil Service Reform Act of 1978, the Federal Government began its own form of this concept entitled, "Merit Pay". Although many studies have examined used in the areas of pay and total compensation, and even in the narrower area of performance-based pay, these studies have focused primarily on the private sector. This is not surprising since "merit pay" has only been in widespread use in the Federal sector for the past two (2) years. However, even in its infancy, there are indications that the pay for performance concept in the Federal Government has not lived up to its expectations. This thesis examines the Federal Government's experience with pay-for-performance, discusses the probable effectiveness of "merit pay" as it now stands, and recommends specific actions for more effective performance-based pay management in the public sector.

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Advisor: J. W. Creighton  
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Administrative Sciences

THE EFFECTS OF PERSONNEL POLICIES ON THE  
RETENTION OF SERVICE COUPLES

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Lieutenant, United States Navy  
B.A., Texas A&M University, 1972

Paul Noel Hixenbaugh  
Lieutenant, United States Navy  
B.A., Fort Lewis College, 1975

The effects of personnel policies on the retention of service couples, service members married to other service members, were studied to determine what factors most cause one or both members to leave the military service and to recommend solutions to increase satisfaction and retention. A survey was mailed to 2,000 service couples; 821 responses were analyzed using the computerized Statistical Package for the Social Services (SPSS). The three major reasons for leaving the military service were inability to co-locate with the spouse, separation from family, and better civilian job. An additional issue of major importance was the requirement for childcare. A number of inequities were found in the treatment of service couples as opposed to members married to civilians on the issues of BAQ, FSA, and dependency. It was concluded that better detailer support of service couples, the correction of some policy inequities and confusion, and improvement in childcare availability would make a dramatic impact on the retention of service couples.

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## A SYNOPSIS OF ACQUISITION RELATED TOPICS

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B.S., University of Colorado, 1968

Managers and potential managers in the acquisition field should find this thesis to be a useful tool. It initiates development of a simple reference that will provide a synopsis of current, important topics relevant to federal acquisition. Individual topics are divided into the following categories: contracting and general acquisition; legal; finance, economics and accounting; production; and logistics management. A broad introduction/definition is given in the initial "discussion" section of each topic for a quick review. Individual topics are generally confined to three to four pages to provide an overview of the topic and mention related concepts. The depth of coverage in each topic should be sufficient for a working knowledge of the concept in relation to negotiation, cost analysis or other aspects of the acquisition field. A list of "references" and a "bibliography for further study" is supplied at the end of most topics as an initial step toward a more in-depth study of the subject matter or for application of the concept to the area of concern.

Master of Science in  
Management  
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## CONTRACT ISSUES IN THE SALE OF COMMERCIAL AIRCRAFT

Bryan Francis Hayes  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., University of San Francisco, 1969

The sale of large commercial aircraft is a highly competitive business, conducted between multibillion dollar corporations. It is a highly visible industry and because of its size and the nature of the business, it is linked with economic growth. Aircraft sales are highly cyclical and influenced by a wide variety of factors. The contract for the sale of aircraft and associated services is the vehicle which specifies the various elements of the agreement between buyer and seller and is used by both parties to allocate risk. This thesis identifies and examines the commercial contract process and the articles or clauses in the typical industry contract, the relationships between the functional contract organization and other functional elements of the firm, and various factors of uncertainty and risk inherent in the commercial aircraft industry. This work provides insights into the contract process as well as an appreciation of the uncertainty and the magnitude of the risk in the U.S. aerospace manufacturer's commercial business activity.

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Advisor: D. C. Boger  
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Administrative Sciences

RISK, DECISION FRAMES, AND EXPERIENCE: IMPACT AND  
RELATIONSHIPS IN A MILITARY SETTING

Douglas C. Hayden  
Captain, MI, United States Army  
B.S., University of Santa Clara, 1971

James W. Thomas  
Lieutenant, CEC, United States Navy  
B.S., Purdue University, 1973

This research effort was designed to examine the Army Officers preference for risk in a variety of military decision-making environments. A questionnaire was developed to elicit an officer's general preference for risk in three areas of decision; combat, finance, and career settings. This survey was administered to approximately 300 Army Officers representing a broad cross-section of the Army population.

It was hypothesized that Army Officers would shift their preference for risk on the basis of the decision frame they faced and that some systematic differences between ranks and other distinguishing demographic variables would be evident. The general results support the conclusion that Army Officers are more risk aggressive in combat decisions than in finance decisions. In addition, there is evidence that there is a tendency for senior officers to be relatively more risk aggressive than junior officers. This indicates that the military promotion and reward system may have a preference for the risk seeker over the risk averse officer.

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U.S. ARMY OFFICER PERCEPTIONS OF THE NEW OER (DA FORM 67-8)

Allan C. Hardy  
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B.S., College of William & Mary, 1975

Keith B. Harker  
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B.S., University of Delaware, 1977

The U.S. Army has long been trying to develop a performance appraisal system which allows selection boards at Department of the Army to discriminate among officers (for promotion, schooling, and assignments), while also providing for the professional development and counseling of these officers. The current Army Officer Evaluation Report (DA Form 67-8), which was adopted in November 1979, is largely based upon the concepts of management by objectives (MBO).

In order to determine the perceptions of Army officers in the field concerning this OER, a sample of officers in the grades of O-3, O-4, and O-5 from three Army installations in central California was surveyed by the authors. The results of this survey show a high general level of support for keeping the present OER, even though specific problem areas do exist where the perceptions of the officers surveyed differ significantly from published official statements and policy.

Master of Science in  
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## LOSS AND DAMAGE IN THE QUICKTRANS SYSTEM

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The purpose of this thesis is to review the QUICKTRANS system with respect to loss and damage. The question has arisen concerning the amount of loss and damage which occurs on the system, and what should be done about it if it is excessive. This review will consist of an examination of the manuals and directives concerning the general operations, and more specifically, the procedures designed to control the freight in the system. The procedures as they are designed will be compared to actual observations of the system in an attempt to identify problems. The loss and damage which occurs will be evaluated to determine if the amount is excessive, based on similar commercial service, and alternatives will be discussed for reducing that which does occur.

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## SELECTION OF AN OPTIMUM AIR DEFENSE WEAPON PACKAGE USING MAUM

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This thesis has developed a planning aid to be used by the airborne air defense commander in the development of his air defense force structure recommendation to the brigade commander. The planning aid presented is a version of multi-attribute utility measurement (MAUM) that provides the commander with a simple and understandable means of organizing multiple inputs in selecting equipment. By working through the steps of the model the commander will be required to rely heavily on use of his judgment; by doing so he will gain significant insight into the interdependencies of the inputs. The MAUM version selected is simple to use and easy to learn. Its format is also flexible and can be adapted to all world-wide scenarios. It provides a time-effective means for developing a force structure and when finished will provide the commander with a format that accommodates an understandable recommendation.

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THE DEVELOPMENT AND IMPLEMENTATION OF THE PROMPT  
PAYMENT ACT SENATE BILL 1131

Kennard R. Hall  
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B.S., Abilene Christian University, 1972

Bobby L. Sutton, Jr.  
Lieutenant, Supply Corps, United States Navy  
B.S., Tennessee Technological University, 1972

The enactment of Public Law 97-177 is considered a most effective directive for improving the Government's bill paying practices. This study, undertaken to investigate the need for such legislation and to analyze procedures established to implement the law, indicate the law has the potential for improving the Government bill paying reputation. Additionally, business concerns will be assisted in improving cash-flow problems generated by the slow bill paying practices of the Government. Problems inherent in the implementation of this law are: reconciling prompt bill payment with Federal cash management practices; ensuring contract funds are not channeled into nonproductive interest payments; reducing the administrative burden created to monitor bill payment and interest penalty payment; assigning responsibility for late payments and funding of interest payments.

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NAVY RESALE SERVICES AND SUPPORT OFFICE CONSOLIDATION  
AND TRANSPORTATION PLAN

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B.A., California State University Long Beach, 1973

David Robert Maddocks  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., St. Mary's College, 1974

This study delineates material consolidation and transportation options available to the Navy Resale Services and Support Office, San Diego, California. The commodities involved are Navy Exchange and Commissary resale merchandise. The discussion includes receipt from manufacturer or distributor, consolidation (if applicable), delivery to the warehouse and distribution to the retail outlets. Quantitative and qualitative aspects of commercial versus government operated facilities, equipment and personnel are explored. Consideration is given to combinations of the two modes for potential economies. Specific vehicle and driver scheduling requirements are derived from the known volume of merchandise to be handled.

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ENLISTMENT STANDARDS AS RELATED TO PERFORMANCE IN AVIATION  
ANTISUBMARINE WARFARE OPERATOR AND AVIATION  
ANTISUBMARINE WARFARE TECHNICIAN RATINGS

Mary F. Gleason  
Lieutenant, United State Navy  
B.S., University of Southern Mississippi, 1973

Clyde D. Sandel  
Lieutenant Commander, United States Navy  
B.A., Angelo State University, 1973

The purpose of this study is to discover if the Navy's system of assigning personnel to the Aviation Antisubmarine Warfare Technician (AX) and the Aviation Antisubmarine Warfare Operator (AW) ratings can be improved. A multivariable model is developed using "success" and "failure" as criterion variables. Biographical and aptitude data available at the time of enlistment are used as predictor variables. Two independent models were created using data available on personnel entering the Navy in 1976, 1977 and 1978. The models were then validated on a new sample.

These models predict the future fleet performance of AX and AW personnel as measured by length of service, paygrade achieved, and recommendation for enlistment. Other results and recommendations regarding implementation and future research are discussed.

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# AN ASSESSMENT OF FACTORS WHICH MOTIVATE NAVY CONTRACTORS

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B.A., Texas A & I University, 1971

Howard Cartwright, Jr.  
Lieutenant, United States Navy  
B.S., University of Mississippi, 1976

The current Defense Acquisition Improvement Program (DAIP) has focused renewed attention on many of the perceived management problems in the federal acquisition process. Included among these are the motivation of the contractors and the methods used to incentivize contract performance. This study examines the complex array of factors which motivate Department of the Navy (DoN) major weapon system contractors, contrasting these factors with current DoN incentive contracting practices.

The authors found that there are many contractual and extra-contractual factors other than profit which motivate contractor behavior; that current incentive contracting methods are generally perceived to be effective; and that the best way to improve the motivation of the contractor is to reduce the impact of the forces which tend to inhibit good contract performance-which are collectively referred to as disincentives.

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MARKET VALUE ESTIMATION MODELS FOR MARINE SURFACE VESSELS  
WITH THE USE OF MULTIPLE REGRESSION ANALYSIS

Thomas D. Johns  
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B.S., United States Coast Guard Academy, 1974

In order to determine more scientifically the value of property assisted by the Coast Guard in search and rescue incidents, regression analysis was conducted on various characteristics of vessels in order to estimate their fair market values. Data for this research were collected from the U.S. Maritime Administration, the U.S. Coast Guard, and numerous oil and steel companies. Mathematical models were developed for merchant ships, tugs, fishing vessels, petroleum-carrying ships, and petroleum-carrying barges. Little correlation could be found in the analysis of yachts. To estimate the value of yachts as well as numerous other varieties of boats, it is prudent to utilize a commercially developed data base. Use of the models along with the commercial data base should provide value estimates for approximately 90 percent of the future Coast Guard search and rescue incidents. The search and rescue data base for previous years cannot be corrected because of the precision required in the measurement of vessel attributes and the categorization of characteristics in the Coast Guard assistance reports.

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QUANTITATIVE AND QUALITATIVE EFFECTIVENESS DIMENSIONS  
OF THE U.S. COAST GUARD RECRUITING PROGRAM

Harvey E. Johnson  
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B.S., United States Coast Guard Academy, 1975

The United States Coast Guard's increasing employment of advanced technology aboard its cutters, aircraft and shore commands has introduced an evolving demand for the consideration of a quality dimension in manpower planning. During recent years, this demand for quality personnel has outdistanced input. Recognizing the requirement for a long term organizational change effort to reverse this trend, this thesis identifies the recruiting program as the most effective agent for that change.

In order to determine the recruiting program's current level of effectiveness, the program's objectives were compared to its FY-82 performance. Additionally, a recruiting effectiveness model was developed from a review of current literature. While a significant level of quantitative effectiveness was noted within current organizational limits, that level was reduced as considerations were made for the qualitative dimension and recruit attrition. The reduction in effectiveness was largely attributable to the lack of clearly stated qualitative objectives and the absence of quality measures from the performance evaluation and control processes.

Significant improvement in the level of qualitative effectiveness requires the explicit inclusion of the qualitative dimension within the program's strategic decision making process. The qualitative objectives can be defined more clearly and operationalized through the development of appropriate performance measures, implemented in recognition of each district's inherent quality and quantity potential.

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## OD INTERVENTIONS THAT ENHANCE EQUAL OPPORTUNITY

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Two issues generated this study: (1) the changing nature of the Navy's HRM Support System both in regard to ideology and structure, and (2) concern from various sectors over what is perceived to be the likely Equal Opportunity Structure in light of system changes. Through the use of interviews, archival data, and subjective evaluation, the impact of the socialization phenomenon is analyzed using the three stage model of socialization. The process of Organizational Socialization is examined strategically. Attention is also directed to these specific organizational boundaries crossed by persons when acquiring a new work role. An underlying theme of the study is simply that what people learn about their work roles in organizations is often a direct result of how they learn it. Given that the present Navy Equal Opportunity Policy calls for Command specific and Command managed E.O. programs this study concludes with considerations that could be criteria for selection of specific organizational Development interventions which will enhance Equal Opportunity objectives at a command level.

These criteria are focused around the organization's concerns for operational readiness and the individual's need for self-esteem and a positive self-image.

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WATER CONSERVATION AS A WAY TO LESSEN THE IMPACT OF  
NEW CONSTRUCTION AT THE PRESIDIO OF MONTEREY

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B.S., University of Oregon, 1969  
M. Div., Yale University, 1972

This thesis considers ways to conserve water at the Presidio of Monterey with reference to the general applicability of the study to other bases. Chapter One describes the current need for water conservation as potable water becomes more of a scarce resource. Chapter Two presents six methods of water conservation: reclamation and reuse, rainwater capture, flow reduction devices for inside application, metering of usage, planting of drought-resistant vegetation, and public education campaigns. Chapter Three evaluates each of these for the specific situation at the Presidio of Monterey. The most beneficial, determined by cost/benefit analysis, is the installation of two particular flow reduction devices--reducers for showers and faucets, and pressure reducing valves--and the institution of public education campaigns. Several suggestions are made for further study since rising costs may make some of the currently nonrecommended options, such as reuse and rainwater capture, more viable.

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MILITARY EDUCATION SYSTEM AND NATIONAL DEVELOPMENT:  
THE CASE OF THE REPUBLIC OF KOREA ARMY

Ko, Gi Wuon  
Major, Korean Army  
B.S., Korean Military Academy, 1973

The primary mission of the military is to wage successful battles in war, but in peace its mission must be that of contributing to national development. This is the modern trend and tendency. In the case of Korea, the military has a double mission of contributing to the nation's development while also preventing war from breaking out by serving as the foremost line of defense against the communists.

This study surveys the role of the Korean Military education system in national development, and examines the interdependence between the military and society in Korea. Finally, a list of recommendations is provided for enhancing benefits from the military education system.

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ARMED FORCES AND NATIONAL DEVELOPMENT, IN  
THE CASE OF THE REPUBLIC OF KOREA

Kab Moon Koo  
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B.S., Seoul National University, 1978

As a modern organization, the military becomes more aware of the need for transition, and it often becomes, itself, an agent of change. In the context of development, the military often stands as the most modern institution in the country. In South Korea, its enormous size has made it the most powerful and best organized group within Korean society imparting modern values to the still traditional milieu. In the case of Korea, the military has a double mission of playing a central role of contributing to the nation's development while also deterring war from breaking out as the foremost line of defense against the Communists.

The military, as a modern institution, has significantly contributed to the development of the Republic of Korea. This study is a documentation of the role of the armed forces and the contribution of the armed forces as a part of national development.

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SHOULD PROMOTION TO CAPTAIN WITHIN THE UNITED STATES ARMY  
BECOME DECENTRALIZED?

Larry Lauderdale  
Captain, United States Army  
B.S., Alabama A&M University, 1973

This thesis analyzes the current policy for promotion to Captain in the United States Army under the centralized process at Department of the Army (DA) level in accordance with DA Pam 600-3. The study of CPTs promotions contained in this thesis is limited to the current active duty promotion system for commissioned officers.

The intent of this study is to determine whether or not the CPTs Promotion Process should remain centralized at Department of the Army level or become decentralized down at the individual's unit commanders level in the field. Several implications for change are discussed. This study also looks at the promotion process as it relates to the Future Army Regimental system that has been approved in principal by the the Army Chief of Staff, General Edward C. Meyers.

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## CONTAINER ACQUISITION IN THE NAVY

Robert Craig Lawrence  
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B.S., Miami University, 1968

This thesis examines the containerization needs of the U.S. Navy precipitated by the recall of Army-owned military vans (MILVANS) currently supporting four Naval logistics pipelines in the Pacific. A brief history of containerization is followed by a discussion of the types of containers in use, the international standards applied to them, and the advantages of the through concept of containerization. The development of military-owned standard containers and containerized cargo movement within the military are then discussed. After the evolution and definition of the problem are presented, viable alternatives for replacing lost MILVAN assets are analyzed. In the process, a framework for analysis is developed that can be further effectively employed by decision makers as desired. In the final chapter, specific conclusions and recommendations are presented regarding the alternatives evaluated.

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A HANDBOOK FOR WORK REDESIGN WITH FOCUS ON JOB  
ENRICHMENT AND TECHNOLOGY

Eustathios Leccas  
Captain, Greek Army  
B.S., Greek Military Academy, 1971

This thesis provides the manager with a review of relevant literature and, most importantly, offers a "handbook" to guide the manager's thinking and actions in implementing work redesign.

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"THE FIFTH VARIABLE" THE PROBLEM OF MANAGING DELINQUENCY  
IN THE PROCUREMENT OF STOCK AND IN-USE ITEMS

Robert Eugene Lee  
Lieutenant, Supply Corps, United States Navy  
B.S., State University of New York, 1975

Delinquency on the part of Navy contractors plays an important role in exacerbating the shortage of repair parts needed to support the fleet. Nearly one quarter of all stock and in-use item contracts can be classified as delinquent. SPCC, in its role as a weapons system life cycle manager, faces a complex, and very real delinquency problem.

The objective of this research effort, is to explore those factors associated with the procurement of stock and in-use items, that contribute most to the problem of managing delinquency. Emphasis is placed on environmental factors and the problems of managing a procurement organization as a public entity. Problem-solving strategies are analyzed and discussed as are contractual and extra-contractual considerations that may help to mitigate the delinquency problem.

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KOREA AIR FORCE AND ORGANIZATION DEVELOPMENT:  
IS THERE POTENTIAL FOR IT?

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Lieutenant Colonel, Republic of Korea Air Force  
B.S., Air Force Academy, Republic of Korea, 1969

Kiyoun Keum  
Major, Republic of Korea Air Force  
B.S., Air Force Academy, Republic of Korea, 1973

Organization Development is a managerial discipline which has been incorporated by all the military services in the United States of America. This thesis examines the need and potential to bring Organization Development into the Korea Air Force in the near future. After explaining what Organization Development is, and how it is used in the U.S. military, Korea's environment, its cultural traits, and the Air Force's particularities are brought into discussion. The view is taken that OD is needed and viable in the Korea Air Force, but that OD should be traied on a gradual basis whith a careful modification process.

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TECHNOLOGY TRANSFER AGENTS' PERCEPTIONS  
OF THE TECHNOLOGY TRANSFER PROCESS

Bernadine Antoinette Lennon  
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B.A., West Chester State College, 1973

The perceptions of technology transfer agents and individuals who staff the Office of Research and Technology Applications (ORTA) at Federal laboratories and agencies are investigated in this thesis. Specific areas which are studied are (1) a description of the technology transfer office, (2) the form of initial contact between technology transfer agents and users, (3) the technology transfer process employed, (4) technology transfer agent and ORTA demographics and (5) areas where the technology transfer process effectiveness can be increased.

The conclusion identifies areas which the technology transfer agents and ORTA's perceive as needing improvement in the technology transfer process both within the laboratory and from the parent agency and also from the Federal government. The perceptions of the ORTA's in the implementation of the Stevenson-Wydler Technology Innovation Act are also discussed. Recommendations are proposed which address the technology transfer agents' and ORTAs' areas of concern.

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THE MANAGEMENT INFORMATION NEEDS OF THE ACTIVITY LEVEL  
COMPTROLLER WITHIN THE MARINE CORPS

Floyd Calvin Lewis  
Major, United States Marine Corps  
B.S., Florida State University, 1971

The objective of this thesis is to answer the question: What is the information needed by the activity comptroller to make financial management decisions? This thesis will be limited to the information requirements necessary to manage the Operations and Maintenance, Marine Corps (O&MMC), fund accounts. The O&MMC account was chosen because it is one of the larger single appropriations, and is difficult to manage, due to the increasing pace of operations and the mission of the Marine corps. Informational requirements for fiduciary reporting are taken as a necessity and will not be addressed in this thesis. It will be shown that most comptrollers use essentially the same information, and that priorities of mission, and other constraints determine their tasks and information needs. The two accounting systems PRIME and MAGFARS supplied essential data but it required manual extraction and manipulation that SABRS will eliminate.

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QUALITY ASSURANCE INITIATIVES FOR THE NAVY'S  
COMMERCIAL ACTIVITIES PROGRAM

Timothy L. Ortel  
Lieutenant, United States Navy  
B.S., Tri-State University, 1977

Richard I. Mather, Jr.  
Lieutenant, United States Navy  
B.A., University of Delaware, 1975

The implementation of OMB Circular A-76 to secure cost savings by federal agencies has resulted in increased contracting out of Commercial Activities (CA) formerly performed by the government workforce. This thesis examines the background of the A-76 policy and describes its requirements. Implementation of the CA program, particularly by NAVFAC, is investigated in detail. An A-76 emphasis on cost effective government operations has fostered the application of statistical quality assurance techniques for CA service contract administration. These are presented, as well as an overview of extrapolated deductions based on sampling techniques. Finally, improvements in organization staffing and structure are examined. The study recommends increased usage of statistical quality assurance, more comprehensive planning and budgeting of inspection resources, and the formation of centralized CA contract administration organizations at the field activity level.

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ESTIMATION OF THE LOCAL DELIVERY COSTS AT NAVAL  
SUPPLY CENTER SAN DIEGO, CALIFORNIA

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Lieutenant Commander, Supply Corps, United States Navy  
B.S., United States Naval Academy, 1972

An analysis is presented of the costs incurred in operating the local delivery system at the Naval Supply Center, San Diego. Specifically, the analysis identifies costs charged to the Navy Management Fund and examines management control procedures being used to monitor the delivery system. A procedure is devised to prorate the costs of Navy and commercial trucks into a standard cost that can be applied to a time standard established for each local delivery route. The findings of this report suggest areas where improvements could be made in the existing system. Only after such improvements are made would some type of vehicle scheduling algorithm possible be of benefit.

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A FRAMEWORK FOR ASSESSING INITIAL ORGANIZATIONAL DEVELOPMENT  
TRAINING IN THE U.S. NAVY AND THE U.S. ARMY

John W. Oravis  
Captain, United States Army  
B.A., Dickinson College, 1974

The United States Navy and the United States Army have been involved with Organizational Development (OD) for nearly a decade. Each service has selected and trained its own consultants for several years, yet there is an absence of literature concerning the effectiveness of such training. This thesis provides a short historical evolution of the Navy's Human Resource Management (HRM) and the Army's Organizational Effectiveness (OE) programs, including a review of the pertinent training literature. It then presents a four-dimensional framework for examining and assessing initial Organizational Developing training in the Navy and the Army. Dimensions of this framework include: selection of military consultants, training course objectives, training course content, and course capacity for self-evaluation and improvement. Application of the author's assessment framework revealed that both the Navy and the Army lack empirically-based consultant selection criteria. Additionally, the author recommends the addition of a practical, "hands on" student learning experience to the HRM Specialist curriculum.

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## REFERENCE GUIDE FOR FEDERAL GOVERNMENT ACQUISITION

Vincent Thomas O'Connor  
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B.A., Old Dominion University, 1974  
M.A., Webster College, 1979

Managers and potential managers in the acquisition field should find this thesis to be a useful tool. This thesis, when joined with a thesis written by CDR J. F. Hetherington in March 1983 entitled "A Synopsis of Acquisition Related Topics", will form a single reference that will provide a review of current, important topics relevant to federal acquisition. Individual topics are divided into the following categories: contracting and general acquisition; legal; finance, economics and accounting; and production. A broad introduction/definition is given in the initial "discussion" section of each topic for a quick review. Individual topics are generally confined to three to four pages to provide an overview of the topic and mention related concepts. The depth of coverage in each topic should be sufficient for a working knowledge of the concept in relation to negotiation, cost analysis or other aspects of the acquisition field. A list of "references" and a "bibliography for further study" is supplied at the end of most topics as an initial step toward a more in-depth study of the subject matter or for application of the concept to the area of concern.

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## MEMORANDUM RECORDS IN RESOURCE MANAGEMENT ACCOUNTING

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B.S., University of New Mexico, 1974

This thesis is the result of a study of formal financial accounting systems at six Naval stations. The study was also used to identify the use of the formal and informal financial systems maintained by the financial managers at the Naval Stations and the purpose for those systems.

The thesis provides an overview of the Navy's formal system of accounting, which is the Resource Management System. The Uniform Management Reports and Resource Management System reports are also overviewed. The study provides insight into how the stations use the Resource Management System and the Uniform Management Reports and compares this to financial information reported up the chain of command. Memorandum records are analyzed in light of the formal accounting system's ability to meet the users' needs for information. Why the current formal system of accounting does not meet the needs of the users is discussed. It is concluded that there is a general lack of knowledge of the content and purpose of official reports.

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## PROMINENT CONSTRAINTS FACED BY GOVERNMENT MANAGERS

Robert T. Niedermuller  
B.S., California State Polytechnic University, San Luis Obispo, 1970

The research focuses on identification of significant regulatory factors influencing the upper level managers of technically oriented Navy Activities. The most often cited constraints were civilian personnel and acquisition regulations. Other constraints identified were rotation of military managers, political influence, and lack of planning. It was concluded that personnel constraints were primarily a result of the poor working relationship between the personnel function and the functional organization. In the case of the acquisition system, the problem is mainly regulatory in nature, but may be alleviated through increased cooperation between the supply personnel and the requiring activity. The constraints are analyzed and methods to improve performance are suggested.

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THE DEVELOPMENT OF SELECTION STANDARDS FOR THREE NAVY  
RATINGS WHICH VARY IN LEVEL OF COMPLEXITY

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B.S., University of Newcastle, 1969  
Diploma in Applied Psychology, University of Adelaide, 1978

This thesis is concerned with selection standards for three U.S. Navy ratings which vary in terms of their complexity. The relevant literature is reviewed and a general selection standards approach is developed. This approach is then applied to subsamples of a large U.S. Navy cohort of enlistees who all had the opportunity of serving for at least four years. Within each rating, prediction equations are developed which link various data available prior to the beginning of the enlistee's service with three criterion measures of performance. Analyses are performed separately for groupings within ratings by race and sex. Utility analysis is employed to help determine optimum cut-offs on predictors. Many potentially useful predictive relationships are found and amongst the results is the finding that for some ratings, ability subtests are negatively related to criteria of performance. Other results are discussed and recommendations regarding implementation and future research are made.

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SOURCES OF CAREER DISSATISFACTION AMONG  
MID-LEVEL COAST GUARD OFFICERS

Larry Linton Mizell  
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B.S., Ohio State University, 1971

This Research project was undertaken to identify the major sources of job satisfaction/dissatisfaction prevalent among mid-level officers (O-3 to O-5) in the Coast Guard. Input to this research effort is provided by Coast Guard officers assigned to a wide variety of units located in California, Oregon, Washington, Alaska, and Hawaii.

Through the use of interviews and questionnaires, factors contributing to both job satisfaction and dissatisfaction were analyzed. It was found that the major sources of irritation disturbing Coast Guard officers are a lack of recognition, frequent transfers/relocation, and a poor quality of leadership/supervisors. The results of this study further suggest that officers place a high value on job challenge, job location, and recognition in achieving job satisfaction. Differences in opinion with respect to rank are insignificant in the majority of areas researched. It is concluded that the majority of officers are fairly well satisfied with their level of career satisfaction but room for improvement does exist.

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ANALYSIS OF MANAGEMENT CONTROL TECHNIQUES FOR THE DATA PROCESSING  
DEPARTMENT AT THE NAVY FINANCE CENTER, CLEVELAND, OHIO

James W. McGlooin  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1975

The Data Processing Department at the Navy Finance Center is presently undergoing a reorganization project which will eventually lead to the establishment of a service-oriented data center for pay and personnel purposes. Analysis and research were conducted to provide the Data Processing Department at the Navy Finance Center with information regarding effective and efficient management control system techniques. Both literature and field research uncovered management methods that have proven to be successful in the data processing managerial arena. Data centers in both the public and private sectors were sampled in an effort to identify current techniques utilized in the computer management field. Those techniques that stood out amongst others and might be considered feasible for future implementation at NFC included management by objectives, 3-5 year cycle and program planning, and project analysis studies performed at Hewlett-Packard Corporation.

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## PREDICTING BUSINESS FAILURE: IDENTIFYING HIGH-RISK CONTRACTORS

William McKinley Matthews  
Lieutenant, United States Navy  
B.S., Middle Tennessee State University, 1974

The purpose of this thesis is to examine the usefulness of the qualitative information found in annual financial reports for making predictions about corporate failure. The content of the presidents' cover letters for a matched pair of firms, failed versus non-failed, spanning the five-year period prior to failure were analyzed and scored for integrative complexity. The major finding was that a firm may be identified as a probable candidate for failure as many as five years prior to the time of entering bankruptcy proceedings. When employed in conjunction with current prescribed analytical techniques utilized by Department of Defense contracting and purchasing officials in determining a contractor's capacity to perform, this technique may prove useful in identifying high-risk contractors, thereby reducing the risk of financial loss to the government.

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PROMPT PAYMENT ACT (PUBLIC LAW 97-177); CURRENT  
IMPLEMENTATION INITIATIVES AND ALTERNATIVES

Danny Gerald Matthews  
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B.B.A., Midwestern University, 1974

Government agencies are required by Public Law 97-177 to pay interest penalty payments to vendors for all bills not paid by a specified due date. The purpose of this study was to investigate the implementation procedures developed by the U.S. Air Force, U.S. Army, and U.S. Navy to comply with Public Law 97-177. The investigation was intended to develop alternative procedures for use in the U.S. Navy that would minimize the impact on operating funds of the Navy. This was accomplished through literature and document research and on site visits to Navy bill paying agencies. The conclusion is that improvements can be made in the Navy's current procedures. Recommendations for changes in the current system include holding claimants and/or subclaimants responsible for subordinate command performance through negotiation of goals and for maturing the current system into one of permanency which will provide incentives for adherence to the goal of timely payment of bills.

Master of Science in  
Management  
June 1983

Advisors: P. W. Blondin  
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AN EXAMINATION OF THE FACTORS INVOLVED IN THE  
MOBILIZATION OF STRATEGIC SEALIFT ASSETS

Thomas R. Markiewicz  
Lieutenant Commander, United States Navy  
B.S., Gannon University, 1968

This study examines the various factors and related problems involved in the mobilization of U.S. strategic sealift assets. Specifically dealt with are the National Defense Reserve Fleet (NDRF), the Ready Reserve Force (RRF), and the Military Sealift Command (MSC). How World War II led to their inception, their roles during the Korean and Vietnam conflicts, and difficulties encountered are included, as well as a financial analysis of the NDRF and RRF during Korea and Vietnam. Thoroughly discussed are the present capabilities of the NDRF, RRF, and MSC to effectively and efficiently respond when activated. Current costs, material condition of units, turn-around time, and manpower assets are considered.

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Management  
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MULTI-YEAR PROCUREMENT: ITS IMPACT  
ON THE SUBCONTRACTOR LEVEL

James C. Madrid  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., New Mexico Highlands University, 1970

The impact of implementation of MYP provisions in major defense acquisitions, at the subcontractor level, was the focus of this thesis. The opinions of subcontractors as to their perceptions of the flowdown of benefits, as a result of this implementation, were investigated. This was accomplished by means of a questionnaire sent to 47 major subcontractors involved in the Air Force's F-16 program and the Navy's C-2 COD program. The results of the survey showed that subcontractors felt that 1) overall multi-year procurement had a favorable impact on their firm; 2) the area of greatest savings was in purchasing EOQ quantities of raw materials, in advance at now year prices; 3) multi-year procurement usually resulted in increased program stability and increased cost reductions; and 4) the surge capacity of industry would be increased and the time required to surge from peace time to war time production would decrease. The survey also revealed, however, that 5) more training is needed both in industry and DOD pertaining to the fundamentals required in executing a multi-year contract. Recommendations are made concerning methods for improving the application and implementation of multi-year procurement at the subcontractor level.

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## THE UNIFORM CHART OF ACCOUNTS AND ITS USE IN MANAGEMENT CONTROL

Tommy J. Little  
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B.S., George Washington University, 1978

John P. Taylor  
Lieutenant, Medical Service Corps, United States Navy  
B.S., George Washington University, 1978

Full implementation of the Uniform Chart of Accounts (UCA) for Department of Defense (DOD) medical operations was accomplished by DOD on 1 October 1979. Both before and after UCA implementation, managers of health care delivery activities expressed concern about two of UCA's fundamental objectives: first, over the appropriateness of using UCA generated data in making comparisons of internal, interservice, intra-service, and civilian sector cost performance; and second, on the use of UCA data as a mechanism for measuring efficiency of operations. This thesis is an attempt to determine whether the prescribed cost accounting process results in information that can be used for these purposes, by either managers at the activity level, or by planners and decision makers at the Assistant Secretary of Defense for Health Affairs in the fulfillment of its DOD medical operations oversight function. The major approach is a critical analysis of the data generated by UCA. The limitations of the current process are discussed and the conclusions reached on the basis of the research and analysis are provided.

Master of Science in  
Management  
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Advisors: D. R. Whipple  
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## A NAVAL OFFICER AS AN ASSET

Robert R. Osterhoudt  
Commander, United States Navy  
B.S., University of Florida, 1966

The purpose of this thesis is to construct and evaluate an alternative approach for the accounting of investments in naval officers. Specifically, the thesis identifies the costs associated with the career progression of a naval officer as either an expired expense or as an investment in the future. Cost comparisons are made between this approach and the more traditional methods which look at marginal costs. This thesis also identifies total costs associated with a particular group of officers over their entire career as well as retirement years. The Naval Officer Investment Model was developed as an integral part of this study and has been used to compare alternative approaches for accounting for the investment costs associated with a naval officer's career.

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U.S. COAST GUARD OFFICER PERFORMANCE MANAGEMENT SYSTEM:  
AN ANALYSIS OF CURRENT COMMITMENT LEVELS AND  
POTENTIAL EFFECTIVENESS INDICATORS

Patrick J. Popieski  
Lieutenant Commander, United States Coast Guard  
B.S., United States Coast Guard Academy, 1972

The United States Coast Guard has implemented a performance appraisal system intended to enable personnel boards within the service to fairly select Coast Guard officers (for promotion, assignment, and schooling), while also providing for the professional development and counseling of the officers. This system, the Officer Performance Management System (OPMS), is based largely on the principles of management by objectives (MBO) and incorporates the use of behaviorally anchored rating scales (BARS) in the process of performance evaluation. The OPMS is similar in concept to the U.S. Army Officer Evaluation Reporting System (OERS) and bears much similarity to the U.S. Army system by using parallel forms, titles, and procedures. Conceptually, future studies of the two systems may provide similar data.

In an effort to assess the current attitudes of Coast Guard officers concerning the Officer Performance Management System (OPMS), the author has administered a survey to a random sample of five-hundred active duty Coast Guard officers. This sample was drawn from pay grades 01 through 06 and is further stratified by career field and geographic area of assignment. The survey attempts to measure reactions, attitudes, and specific areas of knowledge relevant to the OPMS.

The survey responses depict only limited acceptance of the OPMS. Hurdles which this system must successfully bridge may be basically perceptual in nature. However, perceptions often drive realities in

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organizations such as the Coast Guard and thus must not be ignored. Factors that may be of concern for the Coast Guard include perceptions of (1) non uniform applications (2) minimum return on effort, (3) interference with pre-existing priorities, (4) conflict with the organizational context of the service, (5) system inequity, and (6) lack of support for OPMS by the organizational reward structure, among others.

Current and future adjustments to the OPMS processes should not overlook these factors.

COMMANDING OFFICER AND EXECUTIVE OFFICER  
ROLE AMBIGUITY AND UNIT PERFORMANCE

Dale Arthur Rauch  
Lieutenant Commander, United States Navy  
B.S., Findlay College, 1969

This study investigates the phenomenon of role conflict and role ambiguity between Commanding Officers (COs) and Executive Officers (XOs) of U.S. Naval surface ships. It begins by examining the unique relationship which exists between Commanding Officers and their Executive Officers. The need to delegate authority and the concept of dual management with its related issues of task-oriented and social-oriented leadership are reviewed and their application to CO and XO roles is discussed. The implications of informal command structures are then examined. The functionality of their relationship is discussed including the reasons why a division of upper level leadership tasks and managerial roles of a command is made.

The analysis of the relationship of the level of role ambiguity between a CO and XO and its effect on unit performance was prepared using information from a locally developed survey questionnaire and from specific measures of unit effectiveness.

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## CIVILIAN RETURNS TO EARNINGS FROM PRIOR MILITARY SERVICE

Orin Paul Reams, Jr.  
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B.S., University of the State of New York, 1977

The relationship between military service and post-service earnings was analyzed using the 1980 data of the National Longitudinal Survey of young men (14 to 24 years of age in 1966). The sample was broken down by race and veteran status. Two techniques for analyzing post-service earnings were employed. Both the veteran as a dummy-variable technique and the counterfactual earnings technique predicted earnings disadvantages for white Vietnam-era veterans. Results for black Vietnam-era veterans were inconclusive; the veteran as a dummy-variable technique predicted significantly large premiums for veteran status, while the counterfactual earnings equations yielded inconsistent predictions. In sum, the military was found to be an ineffective method of investment in human capital for whites, while the results for blacks were inconclusive.

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Administrative Sciences

AN EVALUATION OF THE EDUCATION AND TRAINING REQUIREMENTS FOR  
ENTRY LEVEL MARINE CORPS OFFICERS IN THE  
MILITARY OCCUPATIONAL SPECIALTY 3415

Brian F. Reed  
Major, United States Marine Corps  
B.S., Colorado State University, 1975

Randall D. McMahon  
Captain, United States Marine Corps  
B.S., University of California, Irvine, 1973

This thesis presents an evaluation of the adequacy of entry level financial management training provided to Marine Corps officers assigned to primary Military Occupational Specialty (MOS) 3415. A financial management questionnaire was distributed to selected senior civilians and all Marine Corps officers who have been assigned either the MOS 3415 or the MOS 9644. The thesis compared the perceived adequacy of the respondents' reported education and training to what the respondents states was required in order to sufficiently perform their financial management duties. The authors conclude that: (1) an inconsistency exists between the MOS Manual and actual assignment policy for MOS 3415; (2) a requirement for entry level financial management training exists; and (3) the scope of financial management training depends on whether the Marine Corps desires inter or intra service instruction along with the level of proficiency to be obtained. The authors recommend; (1) a definitive policy for assignment of primary MOS 3415 be implemented; (2) the Marine Corps examine the feasibility of establishing a entry level course of instruction; and (3) specific entry level billets be identified for assignment.

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LTCOL J. F. Mullane  
Marine Corps Representative

AN ANALYSIS OF THE EFFECT OF PERSONNEL TURBULENCE  
ON THE PERFORMANCE OF OPERATIONAL UNITS

Wayne Ronald Reeves  
Lieutenant Commander, United States Navy  
B.S., Monmouth College, 1971

The purpose of this thesis is to analyze the effect of personnel turnover on the performance of operational Navy units. The Survival Tracking File developed by NPRDC is utilized to determine the rate of turnover aboard a sample of 40 ships. Descriptive data such as length-of-service, years of education, age, etc., are selected to provide demographic information for the people involved in the turnover. Summary CASREP maintenance data were converted to total maintenance downtime per quarter for each unit and used as the measure of ship performance. The relationship between downtime and turnover was examined at the global or aggregate level and at the individual ship level. The data were unable to support any correlation between turnover and ship performance at either level. In addition no relationship was found within classes of ships when grouped by age, type, or size. Descriptive demographic statistics, relative to the personnel involved in the turnover, are provided.

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INTERNAL CONTROL SYSTEMS FOR PURCHASING TRANSACTIONS WITHIN  
THE FOURTH MARINE DIVISION USING UNITS

Chester Arthur Riley, III  
Captain, United States Marine Corps  
B.S., University of Puget Sound, 1975

This thesis presents a suggested generalized design base to be utilized by the using units of the 4th Marine Division when establishing a system of internal controls for purchasing transactions. It stresses administrative controls which help ascertain the need for a purchase instead of how a purchase is accomplished. After a presentation of the requirements for an adequate system of internal controls, suggested generalized controls were presented. A redesigned purchase request document and simplified flow-charts for the source of supply and purchasing method decision questions are the major controls given consideration. A methodology for the implementation and maintenance of the final tailored system of internal controls (developed ultimately by the Purchasing Officer in accomplishing a smooth and complete transition of all personnel who participate in the purchasing process. The final recommendation was that all of the controls be implemented and then adjusted as required.

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A CALCULATOR ADAPTATION OF THE MARKOV CHAIN MODEL  
FOR MANPOWER ANALYSIS

Jeffrey Kendall Sapp  
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B.S., United States Naval Academy, 1977

This thesis provides a foundation for the application of fundamental Markov analysis to manpower modeling in the Armed Services or in other similar organizations. A handheld calculator software package is introduced to assist students, military analysts, and others who model manpower systems. Markov analysis methods are incorporated in program software to permit discrete time investigation of the Navy's manpower structure. A user program guide for application to a broad range of manpower issues is also presented.

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AN ECONOMIC ANALYSIS OF NAVAL INTEGRATED  
VS. CONVENTIONAL PERSONNEL SYSTEMS

Kathy C. Sapp  
Lieutenant, United States Navy  
B.S., Florida State University, 1977

Given the Navy's basic training/readiness objectives and the resources at its disposal, this research examines time streams, costs and benefits. Utilizing cost-benefit analysis techniques this research investigates potential tradeoffs available to Navy policymakers as a result of human capital training investment within conventional and integrated personnel systems. Findings suggest that an integrated personnel system enhances technical skill development, personnel retention and job performance at decreased cost relative to a conventional personnel system.

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FACTORS INFLUENCING THE CAREER ORIENTATION OF JUNIOR  
OFFICERS IN THE UNITED STATES NAVY

Wesley Henry Schmidt, Junior  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

This thesis develops and tests a working model to analyze the career orientation of the junior military officer. In particular, the influence of Navy personnel policies on junior officer career orientation is explored. There are 5 variable categories in this model. The model shows that the variables which measure the individual's overall satisfaction with Navy life are the most influential. The model explains over 40% of the variance in the career orientation among junior officers with more than two and less than ten years of active duty. For two specific subsets of these officers, 60% of the variance in career orientation is explained. Additionally, several conclusions are developed regarding the influence of commission source, perception of alternative job opportunities, and officer's position within his period of obligated service, and his satisfaction regarding the intrinsic and extrinsic aspects of his military job on the career orientation behavior of junior officers in the United States Navy. Knowledge of the relative influence of the variables in this model will provide manpower planners with information needed to evaluate the success of personnel policies designed to increase junior officer retention.

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## NAVY CHILD CARE, 1980

Bonnie M. Scott  
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B.A., Purdue University, 1968

This thesis research was conducted to determine the need for child care services provided by the Navy, and to examine the child care needs of one group of personnel (active duty women) within the Navy. The overall objective was to determine if Child Care Services, both quantity and quality, are affecting retention and force readiness.

Two surveys were conducted for this thesis. The first was a survey of Navy active duty women who had children. The survey was designed to investigate the child care needs, problems, and experiences of this group. The second survey was of eighteen primary Child Care Centers located on Navy bases operated by the Morale, Welfare and Recreation Division of the Navy. This survey was designed to document the operations, services and policies of these centers during 1980.

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IMPLEMENTATION OF PERSONNEL SUPPORT CENTERS  
IN THE UNITED STATES COAST GUARD

Philip Edward Sherer  
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B.S., United States Coast Guard Academy, 1970

This thesis looks at the subject of change in a complex organization. In early 1980 an organizational element of the U.S. Coast Guard experimented with the concept of consolidating personnel records. Success in that experiment along with other external pressures are moving the entire (Coast Guard) organization toward a more centralized personnel records system. This supports a final goal of an automated, computerized pay system.

A primary purpose of this study was to examine and document early efforts at implementing change, with problem identification as a goal. A survey questionnaire administered to Coast Guard Yeomen seeks to identify the concerns of those personnel (in the speciality rating) most actively involved in personnel work. This thesis also identifies areas for strategic planning consideration to assist Coast Guard leaders and managers in the continuing organization-wide (Personnel Support Center) implementation process.

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## WOMEN AT SEA: WELCOME ABOARD?

Joyce A. Sherrod  
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B.A., New York University, 1977  
M.A., Webster College, 1981

Industrial psychologists claim that social acceptance and integration of new personnel on the job is of major importance in the work environment. During fiscal year 1978, 53 female naval officers stepped out of traditional roles and on board a total of 14 ships. This event broke decades of tradition against navy women being permitted aboard line ships. Currently, there are 187 female officers on board a total of 30 ships. This study attempts to discover what actions the commands took in fiscal year 78 to enhance the integration of the first shipboard women officers five years ago and what the women did or experienced that facilitated their integration. This data is compared to the current social integration data. Additionally, this study addresses the issue of what exhibited behaviors were considered acceptable by the shipboard commands for female officers and to what extent these behaviors could be considered typically masculine, typically feminine or androgynous. This is accomplished by using the BEM sex role inventory. Conclusions include an overall improvement in the social integration of women onboard ship and in supervisory relationships. It was observed there is a belief that typically masculine behaviors are encouraged onboard. There is a need for more attention to be focused in the area of command climate.

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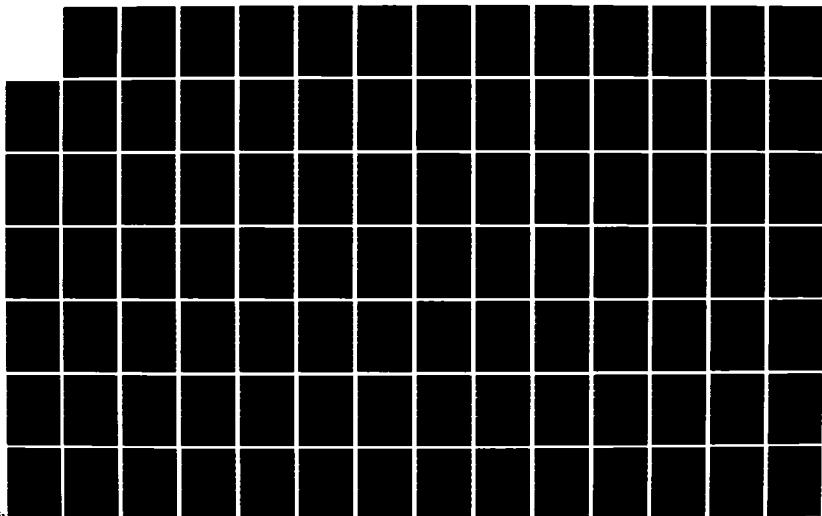
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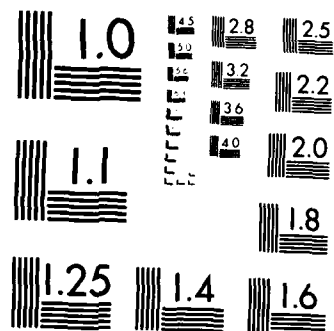
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

## AN ANALYSIS OF THE FINANCIAL INVENTORY REPORTING STRUCTURE

Jack E. Shick  
Lieutenant Commander, SC, United States Navy  
B.S., United States Naval Academy, 1973

This thesis presents a detailed analysis of the Financial Inventory Reporting Structure currently in use by Navy for stores account material in light of the problems uncovered by the Naval Audit Service in their report dated January 1979. The existing structure is described and analyzed at both the stock point and the central accounts level maintained by the Navy Regional Finance Center, Washington, D.C. In addition, the effects of the structure on inventory management are explored and discussed. The Thesis identifies and isolates the level of detail required for the system to fulfill both external reporting and internal management control requirements. This analysis is conducted through a detailed exploration of the stated objectives of the system. Results of this analysis identify an ability to significantly reduce the system's complexity. Finally, a proposal for system modification is presented which could enable Navy to continue to fulfill its objectives with a significantly less complex system structure.

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Management  
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THE IMPACT OF RELIABILITY IMPROVEMENT WARRANTIES  
ON NAVAL AVIATION MAINTENANCE  
AT THE FLEET LEVEL

Donald J. Shutt  
Lieutenant, United States Navy  
B.S., Lowell Technological Institute, 1972

James H. Martin  
Lieutenant, United States Navy  
B.S., Missouri School of Mines and Metallurgy, 1975

The recently published DoD Acquisition Improvement Program increases the emphasis placed on using Reliability Improvement Warranties as a means to improve weapon system reliability and maintainability. Several previous studies have concentrated on RIW selection criteria, cost factors, and reliability improvement incentives. The authors believe that adequate attention has not been given to the fleet level impact of utilizing RIWs. This study reviews past and present contracts to assess these RIW impacts on the Naval Aviation community from an operational and supply point of view. The complexities of fleet level management of warranted assets, the risks posed to the contracting parties, the opinions of fleet maintenance managers, and the RIW's expected fiscal benefits, are among the items discussed.

Master of Science in  
Management  
December 1982

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AN EXPECTED VALUE AIR COMBAT MODEL SIMULATION ALGORITHM  
TO PREDICT MISSIONS PERFORMANCE  
IN TACTICAL AIR OPERATIONS

Efstratios Skliris  
Major, Hellenic Air Force  
Air Force Academy, (HAF), September 1979

This thesis intends to create the basic conceptual background for a non expert analyst so as to be able to follow the logic, structure, development, and utility of an Air Combat Model, using the digital computer.

Initially the reader will be introduced to the concepts, methods and present constraints of Modeling and Simulation focused on Air Operations. Then the thesis will demonstrate a basic application of an air combat model simulation algorithm called "ICARUS".

The model developed in this study is a highly aggregated Theater-Level model which utilizes the allocation of air-craft in various missions on a daily basis to obtain the outcome of an offensive versus defensive systems engagement.

The simulation algorithm which supports the model consist of an air portion including a limited number of factors to accomplish the main objective--to give insight capabilities to a non-expert reader.

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MANPOWER AND TRAINING REQUIREMENTS FOR  
THE U. S. NAVY'S FLEET DIVERS

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Lieutenant Commander, United States Navy  
B.A., Southern Methodist University, 1969

This thesis discusses the manpower requirements of the U. S. Navy's fleet divers. The divers' demographics are described, and comparisons are made with other Navy communities. The divers' training pipeline is discussed, including school capacities, numbers of inputs and attrition rates. The current inventory of divers is matched with the billets authorized for divers, and existing shortages are pointed out. Future manpower requirements are presented, and inventories of each diving classification are projected through FY-87 based on historical transition rates and high and low accession scenarios. The FY-83 Training Input Plan is discussed, and a preferred plan is presented to meet manpower requirements by FY-86. The importance of recruiting sufficient numbers of accessions, and the means for doing so are brought out. Other items discussed are retention, compensation, and the distribution of divers by paygrade, including projections of the paygrade distribution.

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A SENSITIVITY ANALYSIS OF ENTRY AGE NORMAL  
MILITARY RETIREMENT COSTS

Donald F. Smith, Jr.  
Lieutenant Commander, United States Navy  
B.B.A., Memphis State University, 1973

The purpose of the study is to develop an interactive computer model of the entry age normal cost models and perform a sensitivity analysis of both the individual and aggregate entry age normal actuarial cost models under differing economic, managerial and legal assumptions. In addition to the above, a set of simple estimating equations under a probable set of managerial and legal assumptions is provided.

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GENERAL PURPOSE ELECTRONIC TEST EQUIPMENT (GPETE) ACQUISITION  
CONSIDERATIONS FOR AUTOMATED CALIBRATION

William D. Stahler  
Lieutenant Commander, United States Navy  
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Calibration is a vital logistics element that directly impacts operational readiness and mission capability. Declining manpower resources and fleet expansion necessitate improvements in calibration productivity. Toward this end the Navy has initiated several calibration automation programs. Realization of the full potential of automated calibration systems requires that the test instrument be IEEE-488 general purpose interface bus (GPIB) configured. This thesis examines the relative costs and benefits of configuring general purpose electronic test equipment (GPETE) with GPIB to facilitate automated calibration. It does so through the development of a simple cost-benefit analysis and a discussion of non-quantifiable advantages and disadvantages, based upon extensive interviews with experts and literature research. In general, the analysis supports GPIB procurement when procurement quantities are large, calibration procedures are lengthy, and/or the calibration interval is short.

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THE EFFECTS OF DUAL CAREER HOUSEHOLDS AND FAMILY RESPONSIBILITIES  
ON SURFACE WARFARE OFFICER'S CAREER INTENT

Paul Christian Striffler  
Lieutenant Commander, United States Navy  
B.A., Virginia Polytechnic Institute & State University, 1972

The Surface Warfare Officer Career Questionnaire and the Officer Master File data were used to analyze the career intentions of a sample of 1277 year group 1961-1980 married Surface Warfare Officers. This thesis enhances understanding of the effects dual career households and family responsibilities have on Surface Warfare Officers' career intentions. Three theoretical constructs were identified (assignment process, spouse involvement, and family disruptions), which were expected to explain the variance across household career status and family responsibility.

In general, the findings provide moderate support for explaining differences in career intention across household career status, family responsibility, and rank. The persistent interactions found suggest that the spouse's career is incorporated into the officer's family responsibility issues when making career decisions. Additionally, the study raises many questions for future research to address.

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ENLISTMENT STANDARDS FOR TWO NAVY RATINGS: BOILER  
TECHNICIANS (BT) AND MACHINIST MATES (MM)

William L. Synder  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

Wesley A. Bergazzi  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

The purpose of this thesis is the development of enlistment standards by using a multivariate model to predict 'SUCCESS' in the Boiler Technician and Machinist's Mate (Non-nuclear) ratings. The criterion variables utilized included number of days to E-4 and recommendation for reenlistment. Two criterion categories were established within each rating. The predictor variables included entry age, highest year of education and ten individual Armed Services Vocational Aptitude Battery (ASVAB) subtests (forms 5, 6 and 7) that pertain to the time frame, September 1976 to December 1978. The model developed provides the recruiter an analytical method for screening enlistees for either rating with an associated probability for 'SUCCESS' in the rating.

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Management  
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ORGANIZATIONAL EFFECTIVENESS IN THE NAVY: IS  
PARTICIPATIVE MANAGEMENT THE NAVY WAY?

Russell E. Tate  
Lieutenant Commander, United States Navy  
B.S., Northern Arizona University, 1971

Michael E. Aston  
Captain, United States Army  
B.A., Idaho State University, 1973

This research study presents a comparative analysis of how a sample representing ten different paygrades of U.S. Navy personnel view organizational effectiveness. The ten groups that were surveyed and interviewed include enlisted personnel E-5 through E-9, and officer personnel O-2 through O-6. They came primarily from East Coast Surface, Aviation and Submarine commands. The instrument used to collect the data was a modified version of the Navy's Human Resource Management Survey (1977 Fleet version). The modifications allowed sample personnel to associate organizational processes and managerial styles with organizational effectiveness using Likert's four 'Systems of Management'. Comparative analyses were made on the basis of rank, length of time in service, prior attendance at the Navy's Leadership Management Education and Training course, primary location of Navy service, and type of warfare community. Interviews were used to provide both a contextual framework for and a greater understanding of the survey responses.

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ARTIFICIAL INTELLIGENCE TECHNIQUES FOR INDUSTRIAL  
APPLICATIONS IN JOB SHOP SCHEDULING

Wade Benton Townsend  
Lieutenant, United States Navy  
B.S., Florida State University, 1976

The application of AI (artificial intelligence) techniques to the scheduling of industrial production operations offers a promising new approach to a scheduling problem of great magnitude and complexity. Foremost among these techniques is a powerful knowledge representation language that is capable of modeling the production environment at all levels of detail. The capturing of such complexity in the data base enables the computer to generate feasible schedules from a very large solution space which are highly rated by human experts.

An introduction to artificial intelligence is presented that discusses knowledge representation techniques and describes an intelligent scheduling system. The relevance of AI techniques to military industrial production operations is explored by examining the closed job shop in the context of jet engine repair.

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Management  
June 1983

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## ENLISTED PERFORMANCE STANDARDS MODEL FOR THE OPERATIONS SPECIALIST RATE

William E. Wardlaw  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

This thesis describes the results of analyses investigating the selection of recruits entering the Navy for the Operations Specialist rate. Subsequent performance in that rating is predicted from pre-service education, results of pre-selection service aptitude tests, and marital status. Military enlistment files were used to describe the characteristics of non-prior service males entering the Navy. Selection standards for new recruits are developed based upon the relationships found between pre-enlistment characteristics and performance in the Navy.

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DEVELOPING COMPETENCIES FOR NAVY HUMAN RESOURCE  
MANAGEMENT SPECIALISTS: A DELPHI APPROACH

Linda Ellen Wargo  
Lieutenant, United States Navy  
B.S., State University College of New York at Oneonta, 1974

Using the Delphi Method, this thesis develops a list of the desirable knowledge, skills and characteristics for Navy Human Resource Management (HRM) specialists at each of the following career points: (1) upon assessment by a Human Resource Management Center/Detachment for selection for training as an HRM specialist, (2) upon completion of training at the Human Resource Management School, and (3) as a fully-trained, field-experienced, competent HRM specialist. This list is then examined for trends and themes and compared to an extensive review of the civilian literature to develop conclusions and recommendations for its use within the HRM program.

Master of Science in  
Management  
June 1983

Advisor: C. K. Eoyang  
Department of  
Administrative Sciences



CHARACTERIZATIONS OF PREHEATED AND NON-PREHEATED GY-80 STEEL  
WELDMENTS BY TRANSMISSION ELECTRON MICROSCOPY

David Richard Clark  
Lieutenant Commander, United States Navy  
B.S., Purdue University, 1975  
M.P.A., University of Mississippi, 1981

Preheating HY-80 steel weldments is standard procedure, but it is an expensive and time consuming step in the fabrication of hull structures. The microstructures and hardness profiles of both a preheated (250° F--121° C) and a nonpreheated (32° F--0° C) HY-80 steel weldment were studied to provide information and allow comparisons of the microstructural transformations that occur in the heat affected zone during shielded metal arc welding. Optical, scanning electron and transmission electron microscopy were utilized to characterize the microstructure within the heat affected zone of each weldment. The only significant difference observed was that preheating reduced the amount of transformation twinned martensite found in the weld heat affected zone which may reduce the susceptibility to hydrogen induced cold cracking.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: K. D. Challenger  
Department of  
Mechanical Engineering

## EFFECTS OF PREHEAT ON WELDMENTS OF NICOP STEEL

Richard F. Burna  
Lieutenant, United States Navy  
B.S., University of Washington, 1977

Shielded metal arc weldments of Armco Steel Corporation's NICOP class 3, 19mm (3/4 inch) plate, conforming to ASTM A710 grade A, were studied to provide information concerning the microstructure in the heat affected zone (HAZ) of weldments fabricated with and without preheat. Microhardness, scanning electron microscopy and transmission electron microscopy were used to determine the effect of preheating on the microstructure. Similar microstructures in the preheat and non-preheat samples were observed. The microstructures were polygonal and acicular ferrite in the base and base/HAZ regions and increasing amount of bainite and auto tempered martensite islands near the fusion line. From the point of view of microstructure, NICOP appears to be weldable without preheating.

Master of Science in  
Mechanical Engineering  
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Advisor: K. D. Challenger  
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Mechanical Engineering

## DESIGN OPTIMIZATION OF MARINE REDUCTION GEARS

William T. Bramlett, II  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

The development and use of the FORTRAN program MARGO (Marine Reduction Gear Optimization) is described. MARGO performs design analysis, weight minimization, and a rudimentary form of noise minimization using the general purpose optimization program called ADS-1 (Automated Design Synthesis, Version 1). Numerous subroutines are presented which calculate the associated design variables for marine reduction gears. The entire program is self-documented and easily modified by the user. Examples are presented to demonstrate the utility of the program.

Master of Science in  
Mechanical Engineering  
September 1983

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Mechanical Engineering

## CHARACTERISTICS OF A FLUTED NOZZLE GAS EDUCTOR SYSTEM

Jerry Wayne Boykin  
Lieutenant, United States Navy  
B.S.E.E., University of Nebraska, 1976

Cold flow tests were conducted on a four nozzle and a one nozzle gas eductor system. The nozzles employed were fluted with a constant cross sectional area. The four nozzle tests used a mixing stack length-to-diameter ratio, ( $L/D$ ), of 1.5; the single nozzle tests used  $L/D$  ratios of 2.0, 1.75 and 1.5. The total cross sectional area of the four fluted nozzles to the cross sectional area of the mixing stack was 2.5; for the single fluted nozzle, 2.42. Secondary pumping coefficients, mixing stack pressure distributions, and exit velocity profiles were determined.

The pumping performance of the four fluted nozzle system was found to be comparable to a straight nozzle system, showing no specific advantages. The single fluted nozzle system pumping performance showed a slight improvement with increased  $L/D$ . The system performance was comparable to the four straight nozzle system at the same  $L/D$ . The peak exit velocities of the single fluted nozzle system were higher than those for the four straight and four fluted nozzle systems.

Master of Science in  
Mechanical Engineering  
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Advisor: P. F. Pucci  
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Mechanical Engineering

DEVELOPMENT OF A TESTING TECHNIQUE FOR THE YIELD STRENGTH  
DETERMINATION OF 5-INCH STEEL CARTRIDGE CASES

James A. Blasko  
Lieutenant, United States Navy  
B.S.M.E., United States Naval Academy, 1977

The standard Navy method for determining the yield strength of 5 inch steel cartridge cases is shown to overestimate the actual circumferential yield strength of the case by about 40 percent. An expanding ring testing apparatus was developed to measure the actual yield strength. Comparison of this strength with the yield strength measured at different stages of the standard flat tensile sample preparation method revealed that the major cause for the difference is the stress relieving treatment given to the flattened tensile specimens. The increase in the strength during the stress relieving is believed to be due to the precipitation of epsilon carbide and the resulting precipitation hardening.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: K. D. Challenger  
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Mechanical Engineering

A COMPARISON OF THE TUBE-SIDE PERFORMANCE OF ENHANCED  
HEAT TRANSFER TUBING FOR NAVAL CONDENSERS

Ronald Keith Alexander  
Lieutenant Commander, United States Navy  
B.S.M.E., Purdue University, 1971

The data of several investigators conducting research in the area of enhanced heat transfer in internally ribbed and spirally corrugated tubes is compiled and examined to determine the effects of the geometric characteristics of enhanced tubing on flow resistance and heat transfer. The data are compared to determine if there are any relations, either new or previously published, which can be of use to the designer to predict the friction factor and heat transfer coefficient for a specified enhanced tube.

Empirical relations are recommended for friction factor and heat transfer coefficient for single-start and multiple-start spirally corrugated tubes based on the law of the wall similarity analysis and a heat transfer similarity analysis. The empirical relations are compared to experimental data for single-start and multiple-start corrugated tubes with pitch-to-groove ratios greater than 10 and dimensionless groove depths less than 0.05. The recommended relations correlate with the experimental data for heat transfer coefficient within  $\pm 15\%$  for 94% of the specified tubes.

Master of Science in  
Mechanical Engineering  
December 1982

Advisor: P. J. Marto  
Department of  
Mechanical Engineering

**MASTER OF SCIENCE**  
**IN**  
**MECHANICAL ENGINEERING**

A REVIEW OF SHIPBOARD UNIFORM AUTOMATED DATA PROCESSING SYSTEM  
(SUADPS) AS A FINANCIAL INFORMATION AND  
CONTROL SYSTEM FOR OPTAR FUNDS

Randy A. Worley  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Oregon State University, 1973

Responding to the call for better resource management, improvements in financial procedures and practices, and the reduction of waste within the Defense Department, this thesis presents a review of the Navy's major afloat supply and accounting system. A review of this Shipboard Uniform Automated Data Processing System (SUADPS) was conducted to determine if the system met the objectives of an efficient and effective financial information and control system.

A survey of the managers and users of the SUADPS system in relation to financial management aboard several Submarine Tenders was carried out to uncover deficiencies in implementation and recommendations for their improvement or resolution. The thesis findings also provide SUADPS designers and command level management with the user perspectives of SUADPS resource management operations and problems.

Master of Science in  
Management  
June 1983

Advisors: P. Blondin  
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Administrative Sciences



THE IMPACT OF THE DEMONSTRATION PROJECT ON MANAGERS AT THE  
NAVAL WEAPONS CENTER, CHINA LAKE

Yvonne E. Williams  
B.S., University of Southern Mississippi, 1978

A Demonstration Project authorized under the Civil Service Reform Act of 1978 was developed and implemented at the Naval Weapons Center, China Lake and the Naval Ocean Systems Center, San Diego. The Project was designed to increase the participation of line managers in the personnel management function, and to establish a direct link between pay and performance evaluation.

This paper contains a study of managerial opinions and attitudes toward the Demonstration Project. Managerial survey data, analysis, and conclusions are presented, and a cost/effectiveness model is developed based on data obtained after two full-year cycles under the Project.

Master of Science in  
Management  
June 1983

Advisors: W. R. Bishop  
G. K. Jayaram  
Department of  
Administrative Sciences

BUDGETING FOR NONCONSUMABLE ITEMS AT MARINE CORPS  
LOGISTICS BASE, ALBANY, GEORGIA

Frederick C. Williams, Jr.  
Major, United States Marine Corps  
B.S., Arizona State University, 1974  
M.A., Pepperdine University, 1978

During fiscal year 1983 the Marine Corps implemented Phase II of the nonconsumable Items Program. The intent of the program is to provide a single wholesale manager for depot level repairable components and a single wholesale stock for all users. Although general financial guidance such as reimbursement and credit criteria have been provided in Department of Defense instructions, specific methods of budgeting and financial accounting are at the discretion of the individual services. This thesis describes the method currently employed within the Marine Corps at Marine Corps Logistics Base, Albany, Georgia. Alternative methods are discussed including major advantages and disadvantages of each. The thesis concludes with recommended changes for budgeting and financial accounting methods for the Nonconsumable Items Program. The conclusion is that stock funding of the Nonconsumable Items Program would provide flexibility, simplicity and is achievable within the current appropriations structure.

Master of Science in  
Management  
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Advisors: R. E. Euske  
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Administrative Sciences

THE APPLICATION OF SECURITY CONCEPTS  
TO THE PERSONNEL DATABASE FOR  
THE INDONESIAN NAVY

Mulyo Wibisono  
Lieutenant Commander, Indonesian Navy  
B.S., Indonesian Naval Academy, 1967

This thesis is a continuation of the study work done by Moedjiono (M.S. thesis, Naval Postgraduate School, 1982) concerning personnel database in the Indonesian Navy.

It discusses the current database security and the concept of Multics (Multiplexed Information and Computing System) to propose a personnel database security model in the Indonesian Navy.

Master of Science in  
Management  
September 1983

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Administrative Sciences

AN ENLISTED PERFORMANCE PREDICTION MODEL FOR  
AVIATION STRUCTURAL MECHANICS

Robert Donald Whitmire  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1974

Charles Gray Deitchman  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The purpose of this thesis is to determine if the Navy's system of assigning personnel to the Aviation Structural Mechanic (AM) rating can be improved. The technique used is a multivariate model with subjectively defined categories of "success" and "failure" as criterion variables. Biographical data currently available at the time of enlistment are used as predictor variables. Two independent models were created using available data on personnel entering the Navy in 1976 and 1977. The models were validated with data from 1978 entrants.

These models predict the future fleet performance of AMs as measured by length of service, paygrade achieved, and recommendation for reenlistment. Other results and recommendations regarding implementation and future research are discussed. Significant cost avoidance can be realized if these models are implemented.

Master of Science in  
Management  
September 1983

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Administrative Sciences

## ALLOCATION METHODS FOR USE IN THE ACCRUAL OF MANPOWER COSTS

Steven G. Waterman  
Commander, United States Navy  
B.A., Mankato State College, 1966

The purpose of this study is to evaluate alternative methods for accounting for the cost of military retirement benefits. The study identifies the recognized actuarial cost methods that are designed for use in allocating the cost of retirement benefits under accrual basis accounting. Specifically, an entry age normal actuarial cost method is identified as an alternative that can be utilized in applying accrual accounting to the military retirement system. The study demonstrates the application of an entry age normal method, on the individual basis and the aggregate basis, in calculating the annual cost of military retirement benefits for the active force. Either of the two basis is an acceptable method for accounting for the cost of retirement benefits.

Master of Science in  
Management  
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Advisors: K. J. Euske  
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Administrative Science

IDENTIFICATION OF SUCCESSFUL CAREER PATTERNS FOR U.S. ARMY  
ADJUTANT GENERAL CORPS OFFICERS

John D. Warren  
Captain, United States Army  
B.S., B.A., University of Florida, 1972

Jerry J. Novosad, Jr.  
Captain, United States Army  
B.B.A., University of Texas, 1972

The Adjutant General Corps (AGC) of the U.S. Army has, over the recent past, been faced with lower than average promotion rates at the field grade levels. This trend raised many questions during the 1982 World Wide Adjutant General Conference. Questions centered on impact of branch transfer from other corps into the AGC, the importance of combat unit affiliation and training which is not often afforded the accessioned AGC officer and the lack of an identified career path for accessioned AGC to follow which would contribute to the ability of AGC officers to determine appropriate assignments to ensure maximum experience for career progression. This thesis attempts to answer assignment and training questions through the development of a career model based solely on the assignment patterns and acquired training of AGC officers selected or promoted to the rank of Colonel.

Master of Science in  
Management  
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Administrative Sciences

EXPERIMENTAL INVESTIGATION OF TURBULENT HEAT TRANSFER  
IN STRAIGHT AND CURVED RECTANGULAR DUCTS

Steven Floyd Daughety  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

An experimental investigation was conducted to examine the convective heat transfer in straight and curved ducts of rectangular cross-section. The experimental configuration was modeled as infinite parallel plates with one wall at a constant temperature and the opposite wall adiabatic.

The experiments were conducted at steady state for turbulent flow. Average Nusselt numbers were used to compare the heat transfer characteristics of the straight and curved sections. The development of Taylor-Gortler vortices in the curved section was shown to enhance the heat transfer rate in the curved section as compared to that of the straight section by approximately 15 to 20 percent. Improved heat exchanger designs and improved cooling of turbine blades are two disciplines that could benefit from a better understanding of the effects of curvature on the rate of heat transfer.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: M. D. Kelleher  
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Mechanical Engineering

THE EFFECTS OF GRAIN SIZE ON THE MARTENSITIC  
TRANSFORMATION IN COPPER-ZINC-ALUMINUM  
SHAPE MEMORY ALLOYS

Timothy James Gann  
Lieutenant, United States Navy  
B.S., Purdue University, 1975

The effect of grain size on the martensitic transition in a Cu-Zn-Al alloy was studied. As grain size increases the martensite phase is stabilized relative to the parent phase, as indicated by an increase in the martensite start temperature ( $M_s$ ). Martensite stabilization due to thermal cycling is also corroborated. A method of grain refinement is introduced which will consistently yield grain sizes of less than 0.1 millimeters.

Master of Science in  
Mechanical Engineering  
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Advisor: J. Perkins  
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Mechanical Engineering



AN EXPERIMENTAL EVALUATION OF THE THERMAL PERFORMANCE OF A  
ROTATING HEAT PIPE WITH INTERNAL AXIAL FINS

George H. Gardner, III  
Commander, United States Navy  
B.S., United States Naval Academy, 1968

A rotating heat pipe was tested using two different copper condensers (a smooth cylinder and a cylinder with 22 straight axial fins) and water as the working fluid. The smooth condenser was tested at rotational speeds of 700, 1400 and 2800 RPM. The finned condenser was tested at 700 RPM. The heat transfer rate for each run was measured and plotted against the temperature difference between the internal vapor and the cooling water inlet. Representative condenser wall temperature profiles were plotted for each run. The primary objective was to compare the heat transfer rates obtained.

The finned condenser heat transfer rates were 30-40 percent greater than those of the smooth condenser. All data appeared to be influenced by the presence of noncondensable gases. Recommendations for improvements to the rotating heat pipe system are included.

Master of Science in  
Mechanical Engineering  
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Advisor: P. J. Marto  
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Mechanical Engineering

## CONDENSATION HEAT TRANSFER OF STEAM ON A SINGLE HORIZONTAL TUBE

Kenneth A. Graber  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

An experimental apparatus was designed, constructed and instrumented in an effort to systematically and carefully study the condensation heat-transfer coefficient on a single, horizontal tube. A smooth, thick-walled copper tube of length 133.5 mm, with an outside diameter of 15.9 mm and an inside diameter of 12.7 mm was instrumented with six wall thermocouples. The temperature rise across the test section was measured accurately using quartz crystal thermometers. The inside heat-transfer coefficient was determined using the Sieder-Tate correlation with leading coefficient of 0.029. Initial steam side data were taken at atmospheric pressure to test the data acquisition/reduction computer program.

Master of Science in  
Mechanical Engineering  
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Advisor: P. J. Marto  
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Mechanical Engineering

THE DESIGN OF A TEST PROCEDURE FOR THE  
MEASUREMENT OF ACOUSTIC DAMPING OF  
MATERIALS AT LOW STRESS

Ricky A. Heidgerken  
Lieutenant, United States Navy  
B.S.M.E., University of Missouri, 1978

A procedure for measuring the viscous damping of relatively large plate material (up to 40 inches x 14 inches x 2 inches) was developed utilizing the Hewlett-Packard 5451C Fourier Analyzer and impulse hammer technique under very low stress conditions. Testing environment can be lab air or nondistilled water in the temperature range from 30° F to 90° F.

The test procedure includes model analysis that is expandable to other geometric shapes and varied material such as high damping alloys and composites both metallic and non-metallic.

Master of Science in  
Mechanical Engineering  
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Advisor: Y. S. Shin  
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AN EXPERIMENTAL STUDY OF NUCLEATE POOL BOILING HEAT TRANSFER  
FROM A GEWA-T FINNED SURFACE IN FREON-113

Bonifacio G. Hernandez, Jr.  
Lieutenant, United States Navy  
B.S., Columbia University, 1975

A variety of experimental tests were made with a Gewa-T finned surface in Freon-113 to assist in understanding the physical mechanisms which occur during nucleate pool boiling from this type of surface.

The influence of the channels between neighboring T-shaped fins was examined with the use of four aluminum shrouds which had top and bottom windows of various apertures, and which were fitted tightly over the Gewa-T surface. The influence of the fins was examined by progressively machining away the fin height to arrive at a smooth cylindrical surface.

The application of the shrouds increased the heat transfer coefficient at low heat fluxes by as much as 153 percent, but decreased the heat transfer coefficient at high heat fluxes when compared to the unshrouded surface. The addition of the "T-caps" to straight fins produced the most significant improvement in heat transfer performance when compared to a smooth tube. Based upon these results, it appears that the heat transfer performance of the Gewa-T surface is mainly influenced by the effect of the channels created by neighboring T-shaped fins.

Master of Science in  
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# IMPULSIVELY-STARTED FLOW ABOUT RECTANGULAR CYLINDERS

Clyde J. Ihrig  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

Impulsively-started flow about sharp-edged rectangular cylinders has been investigated experimentally. The forces acting on the bodies have been determined, as a function of the relative displacement of the fluid at a subcritical Reynolds number, for various angles of attack.

The results have shown that the shedding of the first two or three vortices and the manner in which they are generated have profound effects on all the characteristics of resistance. The results have also shown that the drag force in the transient state is always larger than that in the asymptotic steady state, pointing out the importance of the understanding of impulsively-started flow about bluff bodies. The data presented here are expected to form the basis of future numerical analyses of similar time-dependent flows. At present, accurate analytical and numerical data, for comparison with those presented herein, do not exist, save for the later stages of motion where the behavior of flow becomes nearly identical to that of steady flow.

Master of Science in  
Mechanical Engineering  
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THE EFFECTS OF ENVIRONMENT AND DWELL ON HIGH TEMPERATURE  
FATIGUE CRACK GROWTH OF 2 1/4 Cr - 1 Mo STEEL

John S. Kamen  
Lieutenant, United States Navy  
B.S.M.E., United States Naval Academy, 1977

The effects of the environment and dwell periods on fatigue crack growth rates at 525°C for both annealed and normalized and tempered 2 1/4 Cr - 1 Mo steel in High Strain Fatigue (HSF) and Linear Elastic Fracture Mechanics (LEFM) regimes in air and in vacuum have been examined using optical and scanning electron microscopy techniques. Fatigue crack propagation rates were determined and were found to vary with the environment and the loading waveform used in the tests. At small crack depths in HSF, oxidation in air increased cyclic crack growth rates by over an order of magnitude compared with vacuum. For continuous cycling tests at a frequency of 0.01 Hz, and tests with a peak tension, compression, or tension plus compression dwell cycling, the rates were similar. The fastest crack growth in air occurred during cycles having both tension and compression dwell periods. Fractographs were analyzed in attempts to understand the reasons for the different propagation rates. Evidence suggesting partial rewelding of the crack surfaces during compressive dwell periods in vacuum and a change in fracture mode from transgranular to a branching "intergranular-like" fracture when the environment was changed from air to vacuum were observed.

Master of Science in  
Mechanical Engineering  
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THE EFFECT OF CONDENSATE INUNDATION ON STEAM CONDENSATION  
HEAT TRANSFER TO WIRE-WRAPPED TUBING

Georgios Dimitriou Kanakis  
Lieutenant, Hellenic Navy  
B.S., Naval Postgraduate School, 1982

Steam condensation heat transfer measurements were made in a 5-tube test condenser having an additional perforated tube to simulate up to 30 active tubes. Results were obtained for smooth tubes and roped tubes wrapped with wire. A Sieder-Tate equation was used to correlate the inside heat-transfer coefficient. For smooth tubes, a leading coefficient of 0.029 was found, while it was 0.061 for the roped tubes. The average condensing coefficient measured for 30 smooth tubes was 0.59 times the Nusselt coefficient calculated for the first tube. When the smooth tubes were wrapped with wire, this ratio increased up to 0.86. Further, roped tubes without wire experienced a ratio of 0.63, while roped tubes wrapped with wire resulted in a ratio of 0.86. These preliminary data show that wire-wrapped tubes may lead to a significant reduction in condenser surface area.

Master of Science in  
Mechanical Engineering  
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EFFECT OF SHROUD GEOMETRY ON THE EFFECTIVENESS  
OF A SHORT MIXING STACK GAS EDUCTOR MODEL

Anastasios Emmanouil Kavalis  
Lieutenant, Hellenic Navy  
B.S., Naval Postgraduate School, 1982

An existing apparatus for testing models of gas eductor systems using high temperature primary flow was modified to provide improved control and performance over a wide range of gas temperature and flow rates. Secondary flow pumping, temperature and pressure data were recorded for two gas eductor system models. The first, previously tested under hot flow conditions, consists of a primary plate with four tilted-angled nozzles and a slotted, shrouded mixing stack with two diffuser rings (overall  $L/D = 1.5$ ). The second consisted of the same nozzles and mixing stack, with a modified shroud and three diffuser rings (overall  $L/D = 1.5$ ).

A portable pyrometer with a surface probe was used for the second model in order to identify any hot spots at the external surface of the mixing stack, shroud and diffuser rings. The second model is shown to have almost the same mixing and pumping performance with the first one but to exhibit much lower shroud and diffuser surface temperature.

Master of Science in  
Mechanical Engineering  
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Advisor: P. F. Pucci  
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Mechanical Engineering



ANALYSIS AND TESTING OF THE THERMAL DESIGN OF THE ELECTRONIC PACKAGE  
IN THE U.S. ARMY'S UPGRADED LOGIC MODULE (ULM)

Henry C. Keebler, III  
Captain, United States Army  
B.S., United States Military Academy, 1973

The U.S. Army has developed an Upgraded Logic Module (ULM) for use in its Infantry Direct Fire Simulator System (IDFSS). It is designed to analyze data collected from associated instrumentation according to prescribed programming, to report results back to the system control via a telemetry interface, and it can be backpack mounted.

The thermal environment existing at Ft. Hunter Liggett, CA (the primary operating environment for the ULM) during the summer will add an abnormal thermal load to the ULM operating environment in the backpack.

A mock-up of the actual ULM was built to model the heat dissipation of all the components and tested in different environments using extreme power consumption rates. The actual ULM was tested with typical power consumption rates and various environmental temperatures, including solar loading. Under typical operating conditions, the ULM will remain within manufacturer's tolerances for individual component temperatures. However slight increases in power consumption rates will severely stress the reliability limits of certain components, and the reliability of the entire system cannot be predicted.

Master of Science in  
Mechanical Engineering  
September 1983

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AN ANALYSIS OF SMOOTH AND AXIALLY FINNED,  
ROTATING HEAT PIPE CONDENSERS

Adam F. Kleinholtz  
Lieutenant, United States Navy  
B.S., University of Oklahoma, 1975

A mathematical model is developed to determine the heat transfer rate of a cylindrical condenser section of a rotating heat pipe. This model is coupled to an existing code and an analysis is accomplished on both a smooth and axially finned condenser. The results of this analysis are compared to those of a similar analysis performed on a tapered condenser heat pipe using identical geometric and operating parameters.

Results of the comparison indicate cylindrical condensers have a lower heat transfer rate than equivalent tapered condensers. This reduction in heat transfer rate is due to a greater condensate film thickness and is most significant in a smooth condenser.

Axially finned condensers with triangular and rectangular fins are assumed to have adiabatic tips. Results indicate the heat transfer rates for these two profiles vary by only 0.40 per cent for both tapered and cylindrical condenser.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: P. J. Marto  
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Mechanical Engineering

## THERMOMECHANICAL PROCESSING OF M-50 STEEL

Keith Robert Larson, Junior  
Lieutenant, United States Navy  
B.E., Vanderbilt University, 1975  
M.S., Georgia Institute of Technology, 1981

Thermomechanical processing of AISI M-50 bearing steel was accomplished by an initial austenitize and quench followed by reheating and warm-rolling to a true strain of 2.0. Warm-rolling was successfully conducted at 650, 700, or 750°C. The effect of austenitizing temperature on grain size and residual carbides was evaluated following austenitizing at temperatures from 1090 to 1250°C. Grain growth was noted with increasing austenitizing temperature, especially for temperatures above 1150°C. Evaluation of the effect of warm-rolling on both carbide refinement and composition was performed using scanning electron microscopy. Comparison of as-received M-50 and the warm-rolled product were made. Temper carbides, those precipitated during the warm-rolling process, are refined by the processing. Residual carbides, those not dissolved in the initial austenitizing treatment, were only slightly refined in the rolling process. Stress-strain testing was conducted on both as-received and warm rolled materials and the increased strength observed were correlated with refined carbide and grain structures resulting from the warm-rolling.

Master of Science in  
Mechanical Engineering  
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Advisor: T. R. McNelley  
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Mechanical Engineering

PROBABILISTIC FATIGUE LIFE PREDICTIONS OF STRUCTURAL  
COMPONENTS IN HIGH-CYCLE FATIGUE REGIMES

Richards W. Lukens  
Lieutenant, United States Navy  
B.S., University of Oklahoma, 1976

A principal mode of failure of structural components in mechanical systems is fatigue. One method of predicting the probability of fatigue failure of a structural component is to determine the probability that the calculated cumulative fatigue damage index is greater than the critical damage index at failure. The cumulative fatigue damage index is represented as a random variable, and the critical damage index is represented by the statistical variance of existing experimental data. A FORTRAN computer code using this failure criteria is presented, which calculates the probability of failure for a structural component in the high-cycle fatigue regime under a random stress response environment, using both the Weibull and log-normal statistical distribution models. The Weibull model has been found to be the more conservative model in the low probability of failure region, which is consistent with failure predictions between the two models using the classical failure criteria of cyclic life.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: Y. S. Shin  
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Mechanical Engineering

**MASTER OF SCIENCE**

**IN**

**METEOROLOGY**

MEASUREMENT OF VELOCITY DISTRIBUTIONS IN TURBULENT  
JETS USING A LASER DOPPLER VELOCIMETER

Mark Donald Wessman  
Lieutenant Commander, United States Navy  
B.S., University of Utah, 1971

The theory of operation of Laser Doppler Velocimeters is discussed for both reference beam and differential Doppler modes. Current entrainment models for velocity distributions in vertical axisymmetric bouyant jets in a quiescent ambient are reviewed. A specific Laser Doppler Velocimeter is used to measure the velocity distribution found in a vertical, axisymmetric turbulent jet discharged into a quiescent ambient and the results are compared to theory.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: W. G. Culbreth  
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AN IMPROVED MODEL FOR A ONCE-THROUGH COUNTER-CROSS-FLOW  
WASTE HEAT RECOVERY UNIT

Steven L. Wesco  
Lieutenant Commander, United States Navy  
B.S. in Applied Science, Miami Universtiy, 1973

An improved model for a once-through counter-cross-flow waste heat recovery unit with a segmented fin-tube arrangement was developed. The model was coded in FORTRAN IV computer language for use on an IBM-3033 computer system, and was tested for various conditions of uniform and nonuniform gas flow distributions. Additional parameters varied were heat exchanger size, steam outlet pressure, steam outlet temperature and gas flow rate. The effect of each variation on WHRU performance was evaluated and the inter-relationship discussed. Results indicate the ideal design is a high steam temperature, low operating pressure, flow distribution controlled heat exchanger.

Master of Science in  
Mechanical Engineering  
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Advisor: P. F. Pucci  
Department of  
Mechanical Engineering

## VARIABLE AREA EJECTOR-DIFFUSER MODEL TESTS

Thomas H. Walsh  
Lieutenant Commander, United States Coast Guard  
B.S., California Maritime Academy, 1966

A modular variable area ejector-diffuser was constructed and tested to establish baseline characteristics that could be used for comparison of results obtained from potential geometric reconfiguration. F404 and TF30 engines (afterburning and nonafterburning modes) were modeled with a scale factor of 22.1. The diffuser-ejector had a cylindrical inlet duct (3.47 inch dia.) which transitioned at an L/D of 1.33 to a conical section with a half angle of 8 degrees for an overall length of 24.0 inches, and with a translating centerbody composed of four conical sections with differing included angles.

Performance was evaluated on the basis of pressure recovery across the diffuser with primary mass flow only, and with the injection of 5% secondary mass flow in addition to the primary mass flow. Tests were conducted in the following ranges of pressure recovery across the diffuser.

	<u>Afterburning</u>	<u>Nonafterburning</u>
F404	1.2 to 2.0	1.1 to 1.6
TF30	2.1 to 3.8	1.2 to 2.5

Maximum primary mass flow and total pressure for the F404 without afterburner (smallest engine modeled) were 0.43 lbm/sec. and 2.95 atmospheres. These same parameters for the TF30 with afterburner (largest engine modeled) were 1.74 lbm/sec. and 2.57 atmospheres.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: P. F. Pucci  
Department of  
Mechanical Engineering



A COMPARATIVE STUDY OF OPTIMIZATION ALGORITHMS  
FOR ENGINEERING SYNTHESIS

Chester Michael Sprague  
Lieutenant Commander, United States Coast Guard  
B.S., United States Coast Guard Academy, 1969

A variety of optimization algorithms for engineering synthesis are included in a new general-purpose optimization computer program called ADS-1 (Automated Design Synthesis, Version 1). Preliminary testing of all presently available algorithms is conducted utilizing several carefully selected problems of significant size and complexity. These include a problem with 56 design variables and over 3500 inequality constraints.

The capabilities and utility of the ADS program coupled with a structural analysis code utilizing finite element techniques is demonstrated and numerical results are presented that compare the relative efficiency and reliability of the various optimization algorithms. The number of function and gradient calculations are considered important measures of merit in comparing the various algorithms.

A comparison of results with another existing optimization computer code is included to document the accuracy and reliability of the ADS program. Preliminary testing of the ADS program demonstrates the flexibility a design engineer would have in selecting an optimization algorithm best suited to solve a particular problem.

Master of Science in  
Mechanical Engineering  
March 1983

Advisor: G. Vanderplaats  
Department of  
Mechanical Engineering

PRELIMINARY PROPELLER SELECTION USING THE WAGENLINGEN B-SCREW SERIES  
AND A GENERAL PURPOSE NON-LINEAR OPTIMIZER

Michael Peter Smith, II  
Lieutenant, United States Naval Reserve  
B.S., St. John Fisher College, 1971  
B.S.E., The University of Michigan, 1976

This thesis presents the use of a general purpose nonlinear optimization program in the preliminary stage of ship design for the selection of a propeller based on methodical series propeller test data. The propeller series utilized is the well-known Wagenlingen B-Series. Three (3) "Design Cases", representing the thrust, power and matching approaches to powering problems, are formulated as FORTRAN subprogram analysis codes for solution by the synthesis/optimization program COPES/COMNIN. Designer constraints considered are:

- 1) diameter limitation
- 2) cavitation limit on expanded area ratio using Keller's criterion
- 3) strength requirement determined by an empirical relation and by a method developed by Schoenherr with modifications by the author.

Objective functions considered are maximized open water efficiency and minimized propeller blade weight. Optimized solutions to specific problems previously presented by other authors are obtained and results are compared.

Master of Science in  
Mechanical Engineering  
June 1983

Advisors: D. Salinas  
G. N. Vanderplaats  
Department of  
Mechanical Engineering

AN INVESTIGATION OF SUBSTRATE EFFECTS ON TYPE TWO  
HOT CORROSION OF MARINE GAS TURBINE MATERIALS

Michael J. Shimko  
Lieutenant, United States Navy  
B.S., University of Maryland, 1977

CoCrAlY coated Modifications of Rene 80 (a Ni base Superalloy) were tested for resistance to Type Two (Low Temperature) Hot corrosion. The effects of Ti and Hf in the substrate (normally 5.0% and 0.0% respectively) and the presence of a Pt underlayer were investigated.

Certain trends were distinguishable from the data obtained. Titanium alone was found to be beneficial. Titanium in conjunction with a Platinum underlayer was found to be detrimental while Platinum underlayers in conjunction with low Titanium concentrations in the substrate were found to be beneficial. Hafnium had a noticeable, but irregular effect only on specimens with intermediate Titanium concentrations. All the above effects were found to be diffusion related.

The study also made certain refinements to the NPS Hot Corrosion Program and direct correlation of data obtained from different runs is now justified.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: D. E. Peacock  
Department of  
Mechanical Engineering

## FINITE ELEMENT GRID OPTIMIZATION

Jesse Blair Schrum  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

Since widespread use of the finite element method began in the early 1960's much effort has been devoted to the development of the method itself, while only recently has there been any research directed at minimizing the discretization error by a proper selection of the element grid. This paper examines some recently proposed grid optimization techniques and applies them to some one and two dimensional linear self-adjoint boundary value problems. Guidelines requiring minimal software modification are recommended to assist the analyst in obtaining improved finite element solutions.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: R. E. Newton  
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Mechanical Engineering

DEGRADATION OF FRACTURE TOUGHNESS IN STEELS DUE  
TO PRIOR STRAIN: A PREDICTIVE MODEL

Gregory Benson Sanford  
Lieutenant Commander, United States Navy  
B.S., University of Idaho, 1972

This thesis quantifies the relationship between prior plastic strain, fracture toughness ( $J_{IC}$ ), plane strain fracture strain ( $\epsilon_{fps}$ ), and yield strength ( $\sigma_y$ ) of HY-series steels at room temperature. Based upon initial J-integral test results of compact tensile specimens that showed a reduction in the fracture toughness with increasing amounts of prestrain, a correlation has been developed where  $J_{IC}$  is directly proportional to  $\epsilon_{fps}$  to the fourth power. Thus, small changes in  $\epsilon_{fps}$  will cause large changes in  $J_{IC}$ . Further, it has been found that prestrain reduces  $\epsilon_{fps}$  by an amount equal to the prestrain. The combination of these two correlations provides a very simple method of estimating the fracture toughness subsequent to plastic straining. Scanning electron microscopy was used to measure the crack tip stretch zone width (SZW), which is a good estimate of the crack tip strain prior to fracture. The SZW does decrease with increasing prior plastic strain verifying the decrease in  $\epsilon_{fps}$ .

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: D. D. Challenger  
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Mechanical Engineering

CHARACTERISTICS OF A FOUR NOZZLE, SLOTTED  
MIXING STACK WITH SLANTED SHROUD,  
GAS EDUCTOR SYSTEM

Nolte Delton Pritchard, Jr.  
Lieutenant Commander, United States Navy  
B.A., Arkansas College, 1974

Cold flow tests were conducted on a four nozzle gas eductor system to evaluate the system's performance utilizing a slotted mixing stack with slanted shroud and diffuser rings. The stack length-to-diameter ratios, L/D, evaluated were 1.5 and 2.25. The nozzles were constructed with a ratio of total area of primary flow to area of mixing stack of 2.5. One set of straight nozzles, and another set tilted at  $15^\circ$  were used. Secondary and tertiary pumping coefficients, and mixing stack pressure distributions were used to evaluate the slant shrouded mixing stacks.

The pumping performance of the four straight nozzle shrouded system was found to be comparable to preciously tested unshrouded models, showing no specific advantages. The pumping performance of the tilted nozzles and slanted shroud showed an improvement over the straight shroud model, with a noticeable increase in the tertiary pumping.

Master of Science in  
Mechanical Engineering  
September 1983

Advisor: P. F. Pucci  
Department of  
Mechanical Engineering

FATIGUE CRACK GROWTH RATES OF HIGH-MAGNESIUM ALUMINUM-MAGNESIUM ALLOYS  
AS INFLUENCED BY SOLUTION TREATMENT TIME AND ALLOY CONTENT

Kurt D. Oberhofer  
Lieutenant, United States Navy  
B.S., State University New York Maritime College, 1977

Test equipment was fabricated and fatigue crack propagation data were obtained for aluminum alloy 7075-T6 and for thermomechanically processed Al-10.2 Wt Pct Mg-0.52 Wt Pct Mn, and Al-8.14 Wt Pct Mg-0.40 Wt Pct Cu alloys. The crack growth data and fractographic information obtained for the 7075-T6 alloy were consistent with data in the literature. The manganese containing alloy was solution treated for nine and twenty-five hour periods. Observed was a decrease in the fatigue crack growth resistance for the longer solutioning time, which appears to be due to the formation and coarsening of Mn Al<sub>6</sub> precipitates which fail to dissolve in solution treatment during thermomechanical processing. The copper containing alloy exhibited better crack growth resistance than the 7075-T6 alloy. This alloy has a more diffuse cell structure, relatively little precipitated Mg<sub>5</sub> Al<sub>8</sub>, and no constituent particles associated with cell or grain boundaries.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: T. R. McNelley  
Department of  
Mechanical Engineering

THE STRUCTURE AND BEHAVIOR OF VACUUM PLASMA SPRAYED  
OVERLAY COATINGS ON NICKEL BASED SUPERALLOYS

Patrick R. Norton  
Lieutenant, United States Navy  
B.S., Purdue University, 1977

The feasibility of using the plasma spray technique for the application of metallic overlay coatings to marine gas turbine components was evaluated. Nickel based superalloy pins were sprayed with various MCrAl coatings using the plasma spray technique, given several types of surface treatments, and then oxidized at 1000 Degrees Centigrade for 100 hours. The effects of the various post-coating treatments on the coating structure and subsequent oxide behavior were investigated.

Master of Science in  
Mechanical Engineering  
June 1983

Advisor: D. E. Peacock  
Department of  
Mechanical Engineering



FRACTURE TOUGHNESS DEGRADATION IN HY-80  
AND HY-100 AFTER PRETRAINING

James Neal Mullican  
Lieutenant Commander, United States Navy  
B.S.M.E.E., Georgia Institute of Technology, 1972

This thesis is the first in a series that is attempting to discover the mechanism by which the fracture toughness  $J_{1C}$  of HY-series steel decreases with increasing prestrain at room temperature. This decrease in  $J_{1C}$  is a function of yield strength and plane strain fracture strain. However, this reduction in  $J_{1C}$  is shown to be caused by a reduction in the plane strain fracture strain. Fractographic examinations have verified this reduction in the fracture strain and also have shown that regions of very low ductility exist due to alloy segregation that is present in bands. The mechanism for the degradation in the toughness is believed to be such that stress-relieving following prestraining would restore the toughness.

Master of Science in  
Mechanical Engineering  
March 1983

Advisor: K. D. Challenger  
Department of  
Mechanical Engineering

AN INVESTIGATION OF THE CORROSION SUSCEPTIBILITY OF FLAME-SPRAYED  
AND ELECTRIC-ARC SPRAYED ANODIC METAL COATINGS OF ALUMINUM,  
ZINC, AND AN ALUMINUM-ZINC ALLOY

Gregory Gower Mead  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1972

Anodic coatings of aluminum, zinc, and an alloy consisting of 99% aluminum and 1% zinc, applied to a mild steel substrate by either the oxygen-acetylene wire flame spray method or the electric-arc spray method, were evaluated for their corrosion protection abilities. The coatings tested were prepared by the Puget Sound Naval Shipyard using standard protection methods. The corrosion testing utilized in the present research included planned interval immersion/emersion, continuous spray, and electrochemical techniques in a solution of 3.5% NaCl. The response of the different coatings to the various tests were studied microscopically. The corrosion products were also studied by x-ray spectroscopy and x-ray diffraction.

Results of the investigation indicate that coatings of aluminum are the most resistant to corrosion in a simulated, aggressive marine environment, that alloying aluminum with 1% zinc in the coating material has no beneficial corrosion preventive effect, and that a pure zinc coating is unsuited for service in a severe marine environment.

Master of Science in  
Mechanical Engineering  
March 1983

Advisor: A. J. Perkins  
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Mechanical Engineering

NUMERICAL SIMULATION OF THE FORCING OF MONSOON  
SURGES BY MID-LATITUDE BAROCLINIC WAVES

Beverly J. Baker  
Captain, United States Air Force  
B.S., University of Washington, 1974

A global, six-level, primitive equation model was numerically integrated to examine the interaction of a mid-latitude baroclinic wave with several different mountain-valley configurations. The purpose was to determine the contribution of a well-developed baroclinic wave to the initiation of a monsoon surge. It was found that these waves can initiate a surge. Such surges are weak and limited in extent but they do exhibit the characteristics of observed monsoon surges. The latitudinal location of the east-west mountain range has a large impact on the strength of the disturbance and thus on the initiation of the surge. However, the size of the valley is not an important consideration. The surge is strongest at the lowest levels and dissipates rapidly with height. Overall results indicate surge forcing by the baroclinic wave is possible but other forcing mechanisms are necessary in order to simulate the stronger, more extensive surges observed during the winter monsoon.

Master of Science in  
Meteorology  
September 1983

Advisor: R. T. Williams  
Department of  
Meteorology

A QUASI-LAGRANGIAN DIAGNOSTICS INVESTIGATION OF RAPID  
CYCLOGENESIS IN A POLAR AIR STREAM

William A. Cook  
Lieutenant, United States Navy  
B.S., Texas A&M University, 1976

A synoptic investigation employing quasi-Lagrangian diagnostic techniques was conducted for a North Atlantic Ocean polar low undergoing a period of rapid cyclogenesis. The polar low was of relatively small horizontal scale and developed in a region of low static stability and large low-level baroclinity, which is consistent with theoretical studies. Rapid surface pressure falls and vigorous circulation increases correlate well with the observed maxima in low-level inward mass transport and upper-level mass outflow, and are temporally coincident with the incursion of the forward divergence quadrant of a jet streak into the budget volume. The most rapid increases of absolute vorticity occurred in the 250 to 300 mb layer, and are related to combined contributions of positive vorticity advection and vertical redistribution processes. The dominant forcing of low-level absolute vorticity increases comes primarily from the divergence source term.

Master of Science in  
Meteorology  
September 1983

Advisor: C. H. Wash  
Department of  
Meteorology

## NOGAPS VERIFICATION USING SPECTRAL COMPONENTS

Peter A. Morse  
Captain, United States Air Force  
B.S., North Carolina State University, 1976

In this study one three-day and two five-day Numerical Operational Global Atmospheric Prediction System (NOGAPS) 500mb forecasts were spectrally verified. The wavenumber components of the observed and forecast waves were grouped into planetary (wavenumbers 1-3), long (wavenumbers 5-7) and medium (wavenumbers 8-12) wavenumbers for verification. The observed and forecast trough-ridge (Hovmoller) diagrams of longitude versus time for each group were analyzed for each case.

In all three cases the most serious errors occurred in the planetary waves were the model after forecast erroneously large of small amplitudes. The long waves were the most accurately forecast group both in amplitude and phase speed. The medium wave amplitudes were forecast too weak and phase speeds were consistantly too fast for this group.

Master of Science in  
Meteorology  
March 1983

Advisor: C. A. Wash  
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Meteorology

NUMERICAL SIMULATION OF THE INFLUENCE OF SMALL SCALE  
MOUNTAIN RANGES ON A BAROCLINIC WAVE

Jeffrey Peter Walker  
B.S., Lowell Technological Institute, 1970

A 6-level hemispheric primitive equation model was numerically integrated to examine the influence of various mountain ranges on a baroclinic flow. The objective was to simulate the apparent topographically-induced cyclogenesis that occurs over south central Alaska and isolate the mechanisms involved. It was found that the model simulates some of the characteristics of cyclogenesis in the lee of the Rockies, Alps, and Greenland. The topography appeared to cause a more local development in the lee at the expense of development over the whole domain of integration. The presence of a gap in the mountains was responsible for generating an eddy in the flow that moved eastward. This eddy became the primary development in cases with "horseshoe-shaped" mountains that had a maximum elevation of 3000 m. The overall results suggest that a weak form of development in the lee of the Alaska Range is possible and that the resulting surface development would be weak but more clearly defined at the 850 mb level.

Master of Science in  
Meteorology  
December 1982

Advisor: R. T. Williams  
Department of  
Meteorology

**MASTER OF SCIENCE**

**IN**

**METEOROLOGY  
AND  
OCEANOGRAPHY**

QUASI-LAGRANGIAN DIAGNOSTICS APPLIED TO AN EXTRATROPICAL  
EXPLOSIVE CYCLOGENESIS IN THE NORTH PACIFIC

Wynn E. Calland  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1975

A case of explosive extratropical cyclogenesis in the North Pacific is analyzed employing quasi-Lagrangian diagnostic techniques in isobaric coordinates. The First GARP Global Experiment (FGGE) Level III-b data set from the European Center for Medium-range Weather Forecasting (ECMWF) is used in a synoptic investigation and mass and vorticity budget diagnostic evaluation of storm development.

Mid-tropospheric positive vorticity advection (PVA) acts in concert with low-level thermal advection to enhance surface layer organization during the initial periods. Explosive development occurs under upper-level zonal flow when the surface system, developing along the low-level baroclinic zone, moves under the front left quadrant of a strong jet streak. Stability in the lower troposphere decreases steadily as an intense two-layer mass circulation is established. The divergence term provides the largest contribution to the vorticity tendency during explosive development due to substantial surface layer convergence and upper-level divergence.

Master of Science in  
Meteorology and Oceanography  
June 1983

Advisors: C. H. Wash  
R. L. Elsberry  
Department of  
Meteorology



AN EVALUATION OF 700 mb AIRCRAFT RECONNAISSANCE DATA FOR  
SELECTED NORTHWEST PACIFIC TROPICAL CYCLONES

George Milton Dunnavaan  
Lieutenant, United States Navy  
B.S., University of Washington, 1975

The 700 mb aircraft reconnaissance data for 25 selected northwest Pacific tropical cyclones were analyzed and compared with similar data for Atlantic tropical cyclones. Correlations of observed winds and winds calculated from the height gradient indicated that the cyclostrophic equation provided a very good approximation of the observed winds, although the root mean square and bias errors suggested that a gradient wind expression was a slightly better estimate. A wind-radius relationship evaluated by Shea and Grav (1972) for Atlantic cyclones was shown to apply very well for this data set also.

Based on the surface pressure-equivalent potential temperature relationship noted by Malkus and Riehl (1960), it is proposed that periods of rapid/explosive deepening are related to the inward transport to the eyewall of "pulses" of high equivalent potential temperature air. The evaluation of the aircraft reconnaissance data from four super typhoons suggests, but does not provide conclusive proof, that such pulses do exist.

Master of Science in  
Meteorology and Oceanography  
September 1983

Advisor: R. L. Elsberry  
Department of  
Meteorology

ANALYSIS OF OBSERVED AND MODELED MIXED  
LAYERS: NOCAL REGION

Diane C. Durban  
Lieutenant (junior grade), United States Navy  
B.S., United States Naval Academy, 1981

Surface mixed layer properties off Northern California (NOCAL) were analyzed statistically and numerically. The observations were acquired on three cruises as part of the Pilot Ocean Prediction Study of the California Current eddies centered ca. 37 to 39N, 125 to 127W during March and August 1982. Mixed layer depth, averaging  $33 \pm 14$  m, had a horizontal correlation scale of no more than 35 Km, which has significance for relating thermal structure information from individual temperature profiles to that of Fleet Numerical Oceanography Center's (FNOG) analyses based on a grid length of approximately 300 km. Simulations and sensitivity tests were made using the Garwood bulk mixed layer model and the Mellor Level-2.5 diffusion model with the initial and boundary conditions acquired at sea and from FNOG. Upper ocean thermal structure analyses and forecasts were also obtained from the Navy's TOPS/TOPS-EOTS diffusion model, which has since become operational at FNOG. Comparisons of observations, analyses, and model solutions reveal consistent cooling and deepening by the former two models and excessive warming by the latter model. These significant differences are believed to be related to model resolution, model sensitivity, oceanic and atmospheric data quality, and spatial variability.

Master of Science in  
Meteorology and Oceanography  
September 1983

Advisor: C. N. K. Mooers  
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Oceanography

## TACTICAL APPLICATION OF AN ATMOSPHERIC MIXED-LAYER MODEL

Ronald Morton Graves  
Lieutenant, United States Navy  
B.S., University of Washington, 1977

Modern Naval weapon and sensor systems are strongly influenced by the marine environment. Foremost among the atmospheric effects is ducting of electromagnetic energy by refractive layers in the atmosphere. To assess the effect of ducting on electromagnetic emissions, the Navy developed the Integrated Refractive Effects Prediction System (IREPS). Research at Naval Postgraduate School (NPS) has led to development of a state-of-the-art model which can be used to predict changes to the refractive profile of the lower atmosphere. The model uses radiosonde data and surface meteorological observations to predict changes in refractive conditions and low level cloud/fog formation over 18 to 30 hour periods. The model shows some skill in forecasting duct regions when subsidence rates can be specified to within  $\pm .0015$  m/s. This thesis shows the applicability of the NPS marine atmospheric mixed layer model to fleet tactics. Atmospheric refractive effects on specific emitters can be predicted when model predictions are used in conjunction with IREPS.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: K. L. Davidson  
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Meteorology

SPECTRUM ANALYSIS OF INERTIAL AND SUBINERTIAL MOTIONS BASED ON ANALYZED  
WINDS AND WIND-DRIVEN CURRENTS FROM A PRIMITIVE EQUATION  
GENERAL OCEAN CIRCULATION MODEL

Nicholas Douglas Gural  
Lieutenant, United States Navy  
B.S., Florida Institute of Technology, 1975

The relationship between the applied wind stress and currents predicted by a primitive equation ocean circulation model was analyzed and compared to theory and observations. Three one-year data sets were examined using Fourier and rotary spectrum analysis techniques. The Fourier analysis revealed three spectral peaks in the predicted currents with none in the wind stress. These peaks correspond to synoptic variability at low frequency, the inertial response at an intermediate frequency and a nonphysical response at high frequency, due to the finite differencing procedure employed. This response at high frequency was two orders of magnitude smaller than the peaks at the synoptic and inertial periods. The inertial motion was the same order of magnitude as the synoptic motion near the surface, but much weaker below. It was identified by the rotary spectrum, and it was slightly shifted toward lower frequencies in direct proportion to the time step used by the model. The Ekman motion appeared to be restricted to the baroclinic response above 70 m. The time-varying "geostrophic" flow below 70 m was essentially barotropic.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: R. L. Haney  
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Meteorology

# ON THE UNSTEADY RESPONSE OF AN OCEANIC FRONT TO LOCAL ATMOSPHERIC FORCING

Christopher James Hall  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1975

The unsteady response of two oceanic density fronts to local atmospheric forcing, using combinations of wind stress and surface heat flux, is investigated with an embedded mixed layer-general circulation model. The adjustment of the frontal structure is dependent upon the wind stress direction and whether there is surface heating or cooling. In cases of an applied wind stress alone where denser water is transported toward less dense water, the frontal structure diffuses, the mixed layer depth deepens, and cross-frontal mixing occurs. In cases where less dense water is transported toward denser water, the frontal structure is preserved, mixed layer depth is preserved and cross-frontal mixing is minimized. The addition of surface heating shallows the mixed layer and inhibits vertical mixing. Inertial oscillations are observed in the across-front velocity field.

Master of Science in  
Meteorology and Oceanography  
June 1983

Advisor: R. W. Garwood  
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Oceanography

A STATISTICAL APPROACH FOR DETERMINING SUBSURFACE THERMAL STRUCTURE FROM  
SEA SURFACE TEMPERATURE IN THE NORTHEAST PACIFIC OCEAN

Terry A. Howell  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1974

Bathythermograph data from the research vessel USNS SILAS BENT along a meridional track in the Northeast Pacific during September 1977 were statistically analyzed to determine possible associations between the subsurface thermal structure and sea surface temperature. Strongly correlated variables (thermocline gradients, mixed layer depth, and locations of the seasonal and main thermoclines) within the vertical temperature profile were used in linear regression methods to form empirical relationships. The generated equations then are utilized to define the subsurface thermal structure from only an input of sea surface temperature. Comparison tests with temporally and spatially removed BT data were conducted with results indicating successful application within a water mass domain with uniformly changing characteristics.

Master of Science in  
Meteorology and Oceanography  
June 1983

Advisor: G. H. Jung  
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Oceanography

FORECASTING TROPICAL CYCLONE RECURVATURE USING AN EMPIRICAL ORTHOGONAL  
FUNCTION REPRESENTATION OF THE SYNOPTIC FORCING

Thomas D. Lage  
Lieutenant, United States Navy  
B.S., Iowa State University, 1975

Empirical Orthogonal Function (EOF) representation of the synoptic forcing is combined with past meridional and zonal displacements (persistence) to forecast tropical cyclone recurvature at 36, 54 and 72 h. Recurvature is defined following Leftwich (1978, 1982): Recurvature is a net displacement northward of  $315^{\circ}$  during the forecast period or the attaining of northeastward motion during the 12 hours prior to the end of the forecast period. The combination of persistence and EOF coefficients consistently out-performed the individual methods for forecasting recurvature in both the dependent and independent data samples. Evaluation scores were the Brier p-score, the Heidke skill score and the percent correctly forecast.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: R. L. Elsberry  
Department of  
Meteorology

# OCEAN MIXING AND CIRCULATION RESPONSE IN THE MARGINAL ICE ZONE

David Gregory Markham  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The purpose of this research was to develop a coupled sea ice-ocean model capable of simulating the upper ocean circulation features of the Marginal Ice Zone (MIZ). A sea ice model using the Rossby-similarity method was added to a two-dimensional, embedded ocean general circulation--mixed layer model. Advection, diffusion, and mixing of bouyancy and momemtum were included in the model to determine their effects on the ocean response. In particular, the case of Northern Hemisphere ice edge upwelling was investigated. Ice edge upwelling was created for a down-ice geostrophic wind and varying surface bouyancy flux forcing. It appeared in model solutions for both stationary and moving ice covers and is driven by a divergence in the oceanic surface transport across the ice edge. These results are supported by the observations of the NORSEX group in the Greenland Sea MIZ (Johannessen et al, 1983). For an up-ice geostrophic wind, the upper ocean response was modified by the bouyancy forcing and ice motion. The combined effects of the wind forcing and ice motion due to a nonstationary ice cover caused weak downwelling at the ice edge. Application of a downward surface bouyancy flux (simulating the ice melting) resulted in a 8 m elevation of the mixed layer depth at the ice edge, or upwelling, next to the downwelling. The existence of this dual (upwelling and downwelling) feature at the ice edge differs from the weak downwelling predicted by Roed and O'Brien (1983). Adding the effects of mixing had a significant impact on the upper ocean circulation response and should be incorporated in future models of dynamical MIZ processes.

Master of Science in  
Methorology and Oceanography  
June 1983

Advisor: R. W. Garwood  
Department of  
Oceanography



A MODEL FOR TIDAL CIRCULATION  
ADAPTED TO MONTEREY BAY, CALIFORNIA

Christine W. Schomaker  
Lieutenant, NOAA  
Sc. B., Brown University, 1972

An implicit numerical model for two-dimensional hydrodynamic flow in coastal seas by Leendertse (1967), as modified by Hart (1976), was applied to Monterey Bay. The model was tested against available water-level and current observations. The responses of Monterey Bay to tidal forcing and steady-state winds were simulated. Under tidal forcing it was found to provide reasonable estimates of sea-surface elevations. Currents were not well predicted, indicating that other mechanisms such as wind, density stratification, and oceanic currents generally dominate the forcing of the circulation in Monterey Bay. The model in its present form was found to be potentially suitable for providing real-time tide correctors during a hydrographic survey, achieving an RMS error of 4.5 cm in predicting sea-surface elevations.

Master of Science in  
Oceanography  
September 1983

Advisors: W. E. Hart  
E. B. Thornton  
Department of  
Oceanography

## UNDERWATER ACOUSTIC PROPAGATION IN THE KOREA STRAIT

Sae Hun Park  
Lieutenant Commander, Republic of Korea Navy  
B.S., Republic of Korea Naval Academy, 1972

On 17 September 1980, a transmission loss (TL) experiment was conducted in the Korea Strait as a joint project between the Naval Air Development Center, U.S., and Agency for Defense Development, Korea. Two propagation paths were measured; the first parallel to the Korea Trench and the second across the trench. The TL, calculated by NADC is greater across the trench than parallel to the trench. A representative Sound Velocity Profile (SCP) WAS selected after examination of twelve locations close to the experimental track. This SVP, bottom type, and bathymetry were used in three computer models and the predictions of TL compared to experimental results. A split-step FFT parabolic equation model and a ray mode model shows little difference in the two directions. An implicit finite difference parabolic equation model shows a significant difference. Agreement along the path parallel to the trench was excellent when 30 dB were added to the experimental results. Agreement across the trench was less satisfactory.

Master of Science in  
Oceanography  
September 1983

Advisor: J. V. Sanders  
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Physics

METHODS OF HYDROGRAPHIC SURVEYING USED BY  
DIFFERENT COUNTRIES

Athanasios Elia Palikaris  
Lieutenant, Hellenic Navy  
Hellenic Naval Academy, 1975

Specifications, procedures, methods and techniques for hydrographic surveying employed by different countries have been examined and compared with each other as well as with the IHO recommended standards. The agencies within the considered countries are the U.S. National Ocean Survey, the British Hydrographic Department, the Canadian Hydrographic Service and the Hellenic Navy Hydrographic Service.

Topics covered include the establishment of horizontal control, connection of sounding datums to vertical control, conventional hydrographic methods and automation. Of particular interest are the Canadian classification of horizontal control through the concept of "confidence region," the root mean square error (drms) adopted by the U.S. NOS for the development of position specifications and the Canadian variation of the bar check method for the determination of echo sounder corrections.

Master of Science in  
Oceanography (Hydrography)  
March 1983

Advisor: G. B. Mills  
Department of  
Oceanography

## DENSITY STRUCTURE ASSOCIATED WITH SALT FINGERS

Suk In Lee  
Lieutenant Commander, Republic of Korea Navy  
B.S., Republic of Korea Naval Academy, 1972

This thesis presents direct measurements of the small scale temperature and velocity signatures of salt fingers. These data were collected by a turbulence package and a Neil Brown Instruments System (NBIS) CTD, mounted on the USS DOLPHIN, near San Diego ( $32^{\circ}46.1'N$ ,  $117^{\circ} 34.2'W$ ) in April of 1982.

The observed CTD data enabled us to determine the relative contributions of salinity and temperature to the local density stratification.

The observed small scale temperature and velocity data were examined to find signatures which might be due to salt fingers. Then the CTD data from the depth of these signatures were examined to verify whether the mean water properties were suitable for fingering to have occurred. The regions corresponding to six observed patches of potential fingers were located on the T-S plot. All occurred where salinity and temperature decrease with depth. This result supports their identification as fingers.

The results suggest that one group of the salt fingers had a horizontal extent of at least 300m and a vertical extent of less than 1m.

Master of Science in  
Oceanography  
September 1983

Advisor: T. R. Osborn  
Department of  
Oceanography

SIDE SCAN SONAR TARGET DETECTION IN THE  
PRESSURE OF BOTTOM BACKSCATTER

Maureen R. Kenny  
Lieutenant, NOAA  
B.S., Michigan State University, 1975

Jeffrey D. Mix  
DMAHTC  
B.S., Massachusetts Maritime Academy, 1977

The effect of bottom backscatter on target detection ranges for 100-kHz Klein and EG&G side scan sonars was investigated. Glass spheres of 16-cm diameter with measured target strengths of -24 dB were deployed in 30-m water depth, 0.7 m above sand and shale bottoms. Controlled test runs past a linear target configuration were performed. For a sand bottom, the Klein system yielded target detections at a maximum range of 150 m with 100% success. The EG&E system yielded 100% detection out to 152-m range, with detection 46% of the time at 259 m and 86% at 228 m. A shale bottom masked all target returns negating detection. Detection thresholds were estimated by comparing field results to theoretical ranges calculated from the sonar equation using applicable backscatter coefficients. The results show that it is possible to determine the geophysical and side scan system inputs sufficiently well to allow determination of the efficient spacing of survey lines in shallow water hydrographic applications of side scan sonar.

Master of Science in  
Oceanography (Hydrography)  
September 1983

Advisors: W. E. Hart  
Department of  
Oceanography

J. V. Sanders  
Department of  
Physics

# LONGSHORE SAND TRANSPORT DISTRIBUTION ACROSS THE SURF ZONE DUE TO RANDOM WAVES

Saad Mesbah M. Abdelrahman  
B.Sc. Civil Engineering, Alexandria University, Egypt, 1973

Analytical and numerical models are developed to predict the longshore sand transport distribution across the surf zone. The models, which also predict the root mean square wave height,  $H_{rms}$ , and the longshore current,  $V$ , are compared with field data acquired from Leadbetter Beach, Santa Barbara, California, during the intensive storm period in February, 1980. The breaker coefficient,  $B$ , and the bed shear stress coefficient,  $c_f$ , when equal to 1.1 and 0.005, were found to give the best agreement between the predicted  $H_{rms}$  and  $V$  with the field measurements. The model for a plane sloping beach predicts the maximums and transport at offshore distance  $X$  equal to  $0.8X_b$ , where  $X_b$  is the mean breakerline location, which agrees with Komar (1977a). The longshore sand transport formula, suggested by CERC (1977), is used to calibrate the model which requires the empirical transport coefficient  $B_s$  to be 0.18.

The sand transport cross-shore distribution predicted by the model does not agree well with the corresponding transport inferred from the field measurements. Reasons offered to explain the differences are (1) that the model does not include the swash zone where the maximum transport is found and (2) that beach profile information beyond a distance of 100 m offshore was incomplete. The results indicate the importance of including the swash zone to describe the effect of the long waves in predicting the sediment transport.

Master of Science in  
Oceanography  
June 1983

Advisor: E. B. Thornton  
Department of  
Oceanography

**MASTER OF SCIENCE**  
**IN**  
**OCEANOGRAPHY**

## COMPARISON OF WAVE CELERITY THEORIES WITH FIELD DATA

Michael Richard Syvertsen  
Lieutenant, United States Navy  
B.S., University of Washington, 1977  
B.A., University of Washington, 1977

Three independent wave celerity data sets, measured on natural beaches, are compared with linear, bore, solitary, and hyperbolic wave theories. In the range of relative water depths ( $.006 < h/T^2 < 13 \text{ cm/s}^2$ ) and wave heights ( $.1 < H/T^2 < 3 \text{ cm/s}^2$ ) tested, hyperbolic wave theory, which is an asymptotic form of cnoidal theory in shallow water, agreed most closely with measured wave celerities. Linear wave theory also gave satisfactory results; but bore and solitary wave theories overestimated the observed wave speeds. It is concluded that the observed waves are weakly dispersive in amplitude and that care must be taken to apply the theories only in their regime of validity.

Master of Science in  
Meteorology and Oceanography  
March 1983

Advisor: E. B. Thornton  
Department of  
Oceanography



PRELIMINARY INVESTIGATION OF THE ENVIRONMENTAL SENSITIVITY OF  
ACOUSTIC SIGNAL TRANSMISSION IN THE WAVENUMBER DOMAIN  
WITH RESPECT TO SOURCE DEPTH DETERMINATION

Billy Barton Stamey, Jr.  
Lieutenant, United States Navy  
B.S., College of Charleston, 1976

The Wavenumber Technique (WT) is a relatively new method of underwater sound transmission analysis. One aspect, source depth determination, is studied to evaluate its validity and test environmental and acoustic sensitivity. The horizontal wavenumber spectrum is analyzed to determine null spacings in wavenumber space, which indicates source depth by the Lloyd's Mirror interference effect. Comparison of this theory with cases of an isospeed sound profile, fully absorbing bottom, and flat totally-reflecting surface shows excellent agreement for several parametric variations. Cases with realistic sound speed profiles and partially absorbing bottoms generally agree with theory, but a distinct bias is observed. Source depth determination curves, which relate the scaled wavenumber spectral intensity null spacing to the source depth, are presented for comparison with theory and sensitivity analysis. An example is given for suggested application of source depth determination.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: A. B. Coppens  
Department of  
Physics

## INTERPRETATION OF A SAR IMAGE OF THE BAY OF BISCAY

Jean-Francois Soubrier  
Lieutenant de Vaisseau, French Navy

On August 20, 1978, the Synthetic Aperture Radar (SAR) on board the satellite SEASAT, gave evidence of high energy internal oceanic activity at the shelfbreak in the northern part of the Bay of Biscay.

Quantitative spatial measurements of internal wave patterns were correlated with conventional, quasi-synoptic in situ data and yielded phase speeds of 0.55M/S for high frequency, nonlinear internal waves, generated in groups at the canyons indenting the shelfbreak and at the time of low tide in Brest. Their periods were found to be of 70MIN and their amplitudes estimated to be 15M. Ocean swell refraction, observed on the SAR image, together with a localized significant increase in wave height detected by the SEASAT altimeter, was related to the shear of a northwestward geostrophic jet (ca. 0.5M/S) at the break.

Possible operational consequences of these features are summarized as an assessment of a SAR's capability to give tactical as well as scientific real-time information on the internal ocean.

Master of Science in  
Meteorology and Oceanography  
September 1983

Advisor: C. N. K. Mooers  
Department of  
Oceanography

BAROCLINIC ROSSBY WAVE SIGNATURE IN A  
GENERAL CIRCULATION OCEAN MODEL

Arno H. Rutsch  
Lieutenant, United States Navy  
B.S., University of Michigan, 1974

Monthly mean values of temperature output for a ten-year period (1969 - 78) from a three-dimensional primitive equation ocean model are used to compute isotherm displacements at eight selected grid points in the North Pacific Ocean. The ocean model input parameters are climatological radiation, clouds, surface air temperature, surface humidity and six-hourly synoptic winds taken from Fleet Numerical Oceanography Center analyses. The first five baroclinic modes are computed from the mean temperature profiles at the eight selected model grid points and these modes are then fit in the time domain to the isotherm displacements.

The fit shows evidence of baroclinic free Rossby waves in the time domain at the selected grid points south of 40N and indicates the predominance of the first baroclinic mode. At the selected grid points north of 40N, the results are inconclusive. This is due to the longer periods required at the northern latitudes, the neglect of salinity, and masking by a strong seasonal signal caused by surface heating and cooling at higher latitudes.

Master of Science in  
Meteorology and Oceanography  
June 1983

Advisor: R. L. Haney  
Department of  
Meteorology

FORMULATION OF A PROTOTYPE COUPLED ATMOSPHERIC  
AND OCEANIC BOUNDARY LAYER MODEL

Michael Charles O'Loughlin  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

A prototype coupled Marine Atmospheric Boundary Layer (MABL) and Ocean Boundary (OBL) model, from physical models which have been separately formulated, is developed. The observational efforts will be directed toward coupling (local) point MABL and OBL features. Emphasis in the characterization of local features will be on the evolutions of the adjacent well-mixed layers. The approach will be to compare observed evolutions in the oceanic and atmospheric boundary layers with predictions from bulk models wherein the ocean influences the atmosphere through the surface temperature which, in turn, is influenced by atmospheric forcing. The atmospheric forcing parameters are the local surface turbulent fluxes and radiation. Surface turbulent fluxes are controlled by the surface temperature and atmospheric mixed layer parameters. Radiation is controlled by predicted cloud formation and dissipation.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: K. L. Davidson  
Department of  
Meteorology

ESTIMATION AND MAPPING OF CLOUD AND RAINFALL AREAS  
WITH AN INTERACTIVE COMPUTER

Cynthia Ann Nelson  
Lieutenant, United States Navy  
B.S., Indiana University, 1971  
M.S., State University of New York, Geneseo, 1972

An automated cloud analysis program was developed and established on the SPADS computer system at the Naval Environmental Prediction Research Facility (NEPRF). The program evaluates GOES visual and infrared satellite imagery simultaneously. The analysis method produces information on cloud types, cloud amount, precipitation intensity, and cloud top height and temperature through use of threshold tests of radiance, texture, and temperature. A review of current work on the evaluation of satellite information by computer and by manual analysis is included.

A maritime region 460 x 460 nautical miles in size was selected for test analysis. The satellite imagery was manually evaluated and compared to the computer generated output. Reasonably good patterns of cloud types, precipitation and cloud amount were produced by the computer, although further testing and verification is needed.

Master of Science in  
Meteorology and Oceanography  
December 1982

Advisor: C. H. Wash  
Department of  
Meteorology

THE USE OF COMPUTER INTENSIVE STATISTICAL MODELING IN ESTIMATING  
THE VARIABILITY OF MARINE FOULING COMMUNITIES

David L. Martin  
Lieutenant, United States Navy  
B.S., University of Washington, 1976

The variability of the fouling community in Monterey Bay was investigated by suspending 100 mild steel plates in Monterey Harbor. The plates were painted with either a nontoxic control paint or one of three anti-fouling paints. Following the monthly retrieval of a group of these plates, a census of the fouling organisms was conducted and initial variability estimates determined. These estimates were used as inputs for bootstrap computer simulations were then used to determine an appropriate strategy for sampling the fouling community in Monterey Bay. The results indicate that twenty to thirty plates are required to resolve ambiguities concerning the mean percent cover of a group of plates while many more are required to quantify the variability of the fouling population.

Master of Science in  
Meteorology and Oceanography  
June 1983

Advisor: E. C. Haderlie  
Department of  
Oceanography

AN ERROR ANALYSIS  
OF  
RANGE-AZIMUTH POSITIONING

David A. Waltz  
Lieutenant, National Oceanic and Atmospheric Administration  
B.S., University of Alabama, 1971

Pointing error standard deviations for two theodolites, the Wild T-2 and Odom Aztrac, were determined under conditions closely approximating those of range-azimuth or azimuth-azimuth hydrographic surveys. Pointing errors found for both instruments were about 1.3 meters, and were independent of distance. No statistical difference between the errors of the two instruments was found. The accuracy of the interpolation methods used by the National Ocean Service (NOS) for range-azimuth positioning were investigated, and an average inverse distance of about 2.5 meters was observed between interpolated positions and corresponding observed positions. The overall range-azimuth position errors of the two theodolites were then compared to positioning standards of NOS and the International Hydrographic Organization, using assumed ranging standard deviations of 1.0 and 3.0 meters. Both instruments met all standards except the NOS range-azimuth standard for 1:5,000 scale surveys. Interpolated positions may fail to meet more of the standards because of additional inherent error.

Master of Science in  
Oceanography  
September 1983

Advisor: G. B. Mills  
Department of  
Oceanography

**MASTER OF SCIENCE**  
**IN**  
**OPERATIONS RESEARCH**



IMPLEMENTATION OF A RELIABILITY SHORTHAND  
ON THE APPLE II+ MICROCOMPUTER

Eckhard Bartens  
Captain, German Army  
Dipl.-Ing., Fachhochschule des Heeres I, 1975

It is shown how to use a reliability shorthand to get analytical results for small systems. The underlying probability distribution is the exponential function. An algorithm is described to convolve exponentially distributed random variables, and two computer programs are given to obtain numerical results for convolutions and mixed convolutions. After describing systems in shorthand notation, the programs can be used to compute reliabilities for these systems. The programs are coded in UCSD-Pascal for use with an Apple II+ and an Apple III.

Master of Science in  
Operations Research  
September 1983

Advisor: J. Esary  
Department of  
Operations Research

ESTABLISHMENT OF WEARMETAL GUIDELINES FOR  
ARMY GROUND EQUIPMENT

Richard Frank Bauer  
Captain, United States Army  
B.S., Cornell University, 1974

This thesis utilizes historical wearmetal data from the Ft. Ord Spectrometric Oil Analysis laboratory to propose wearmetal level and trend guidelines for equipment powered by the Continental LD/LDS/LDT 465/465-1 engine. The methodology proposed for determining trend guidelines requires data giving the parts-per-million (PPM) level of a given wear-metal at a known time since oil change.

Master of Science in  
Operations Research  
June 1983

Advisor: H. J. Larson  
Department of  
Operations Research

RIMAIR VS. CURRENT ASO POLICY: A COMPARATIVE ANALYSIS OF  
TWO METHODS FOR DETERMINING AVCAL STOCKAGE LEVELS

Brooks O. Boatwright, Jr.  
Lieutenant, United States Navy  
B.S.E.E., United States Naval Academy, 1977

The allocation of spare parts for deployed Naval aircraft is delineated by an aviation consolidated allowance list (AVCAL). The current policy for stocking AVCAL's has been found inadequate to meet the Chief of Naval Operation' (CNO) goal for stockage level effectiveness. This led to the development of the Retail Inventory Model, Aviation (RIMAIR) as an alternative stockage policy.

This thesis compares the two models on the basis of stockage level effectiveness (ratio of demands filled to total demands) and the availability afforded three hypothetical systems.

The RIMAIR model allows the budget constraint to dictate stockage levels while the current policy is deterministic. However, RIMAIR stockage levels are bounded by both a minimum and maximum constraint which limit its flexibility. As a result, RIMAIR stockage levels and total cost are considerably higher than currently allowed. The effectiveness and availability measures are also much higher. A modified RIMAIR model provided increased effectiveness and availability on an equal cost basis with the current policy.

Master of Science in  
Operations Research  
September 1983

Advisor: F. R. Richards  
Department of  
Operations Research

METEOR: A TOOL FOR EVALUATING MULTI-ECHELON  
INVENTORY MODELS AND MATERIAL READINESS

Thomas Allan Bunker  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., University of Minnesota, 1972

There are many multi-echelon inventory models in use within the Department of Defense. These models have been used primarily to determine inventory levels at various echelons of supply for complex, multi-indentured, hardware systems. Their objective is, generally, to maximize some measure of equipment readiness, subject to budgetary constraints. These models vary in their structure, assumptions, mathematical objectives, and optimization procedures.

This thesis examines the characteristics of these models and offers an alternative simulation model, Multi-Echelon Technique for Evaluating Operational Readiness (METEOR), which can be used as a common framework from which to compare and evaluate the analytic models. In the examination of other simulation models used by the Navy, it is believed that METEOR is unique in its ability to accomplish this purpose. METEOR may also be used to evaluate the impact of changes in supply related policy on equipment readiness.

Master of Science in  
Operations Research  
March 1983

Advisor: F. R. Richards  
Department of  
Operations Research

INTEGRATION ANALYSIS: A PROPOSED INTEGRATION OF TEST AND  
EVALUATION TECHNIQUES FOR EARLY ON DETECTION OF  
HUMAN FACTORS ENGINEERING DISCREPANCIES

David Leo Carlson  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The objective of this thesis is to address the idea of implementing a viable T&E technique at the early stages of DT&E in order to reduce design discrepancies and minimize acquisition costs and time. This technique involved integration of Task Analysis, Operator Interviews and Link Analysis to evaluate a system's Functional Mock-up. The technique will, therefore, be referred to as the Integration Analysis throughout the paper. In order to provide a measure of its contribution, it will be implemented on a recently procured system that experienced numerous HFE design discrepancies at its OT&E stage. The system in question, the Recovery Assist, Securing, and Traversing (RAST) System associated with the LAMPS MK III Acquisition, revealed HFE problems in relation to its LSO Control Station. The use of the subject technique could have discovered a majority of those problems much earlier in the Acquisition Process.

Master of Science in  
Operations Research  
March 1983

Advisor: C. W. Hutchins  
Department of  
Operations Research

EXAMINATION OF THE SONAR DETECTION MODELS USED BY  
THE NAVAL WAR COLLEGE GAMING SYSTEM

David Martin Cashbaugh  
Lieutenant, United States Navy  
B.E.E., Gworfia Institute of Technology, 1975

This thesis describes an evaluation of the active and passive acoustic detection modules of the Naval War College Gaming System (NWCBS) that has been installed at the Naval War College in Newport, Rhode Island. The specific intent of the evaluation is to verify that the model is theoretically sound. This evaluation compares the NWCBS model to other existing acoustic detection models. Recommendations for improvement to the model are also presented.

Master of Science in  
Operations Research  
June 1983

Advisor: N. Forrest  
Department of  
Operations Research

EFFICIENT COMPUTATION OF THE K-TERMINAL RELIABILITY  
OF DIRECTED ACYCLIC NETWORKS

Chan Lee  
Major, Republic of Korea A.F.  
B.S., Republic of Korea A.F. Academy, 1973

Several topological reduction and decomposition techniques are developed to decrease the complexity of computing  $R_{SD}(D)$ , The source-to K-terminal reliability of an acyclic directed network D with independent component failures.  $R_{SD}(D)$  is computed in  $O(V E)$  time when D can be completely reduced. When not completely reduced, a graph  $D'$  remains such that  $R_{SK}(D) = M R_{SK_1}(D_1) R_{SK_m}(D_m)$  where M is a known constant and the  $D_i$  are more separable components of  $D'$ . A simple scheme, exponential in  $V_i - K_j$ , is given for computing  $R_{SK}(D)$ . When  $V_i - K_j$  become too large, a truncated version of this scheme usually gives an excellent lower bound on  $R_{SK}(D)$ .

A program using these techniques has been coded in FORTRAN and tested on "complete" acyclic directed graphs and "street" networks with up to 100 vertices. Running on an IBM 3033AP under FORTRAN H (Extended), total CPU time for computing exact reliability is less than 3.5 seconds when  $V - K \leq 10$  and  $V \leq 100$

Master of Science in  
Operations Research  
September 1983

Advisor: R. K. Wood  
Department of  
Operations Research

## SOME STOCHASTIC-DUEL MODELS OF COMBAT

Jum Soo Choe  
Lieutenant Colonel, Republic of Korea Army  
B.S., Republic of Korea Military Academy, 1968

This paper provides the conceptual foundation for stochastic-duels and then develops a modest extension to more realistic combat situations. Simple stochastic models for the fundamental duel and the classical duel are reviewed. A modest extension is developed for the theory of multiple duels: when all firing times are continuous random variables, an expression for the probability of winning such a duel is derived by using the theory of continuous-time Markov chains.

Master of Science in  
Operations Research  
March 1983

Advisor: J. G. Taylor  
Department of  
Operations Research



THE EFFECT OF NOISE AND DISPLAY ORIENTATION  
ON COGNITIVE PERFORMANCE

Seong Hwan Choi  
Lieutenant Commander, R.O.K. Navy  
B.S., R.O.K. Naval Academy, 1975  
B.S., Seoul National University, 1978

Military personnel encounter a variety of noise environments. During exercises, high intensity noise levels are often encountered. 24 subjects were required to respond to symbols presented under two levels of task difficulty, two levels of presentation rate, two levels of display orientation, and three levels of noise intensity. The purpose of the experiment was to determine whether noise intensity and display orientation had any effect on a short-term memory task. Results showed that continuous white noise at intensity levels of 30, 85, and 105 dB had no effect on the shortterm memory task. Presentation rate and task difficulty demonstrated a significant relationship with task performance as did their two-way interaction. This two-way interaction between presentation rate and task difficulty exhibited a different pattern for the two levels of display orientation.

Master of Science in  
Operations Research  
September 1983

Advisor: C. W. Hutchins, Jr.  
Department of  
Operations Research

## A MERCHANT SHIP SIZE OPTIMIZATION MODEL

Choi Ki Chul  
Commander, Republic of Korea Navy  
B.S., Republic of Korea Naval Academy, 1972

This paper analyzes how a shipowner or charterer may determine the specification of optimal ship size for a given route with respect to certain market requirements.

The theory of optimal ship size, a methodology for estimating scale economics, and the various factors affecting ship size are examined using a typical conventional cargo ship and bulk cargo carriers based on shipowners' cost data.

Master of Science in  
Operations Research  
September 1983

Advisor: P. M. Carrick  
Department of  
Administrative Sciences

TWO MODELS OF TIME CONSTRAINED TARGET TRAVEL BETWEEN  
TWO ENDPOINTS CONSTRUCTED BY THE APPLICATION OF  
BROWNIAN MOTION AND A RANDOM TOUR

William Justin Comstock  
Lieutenant, United States Navy  
B.A., University of Michigan, 1972

A target must choose a path between some origin and destination. The total travel time and the target speed are specified, and the target wishes to maximize the "randomness" of its track subject to the spatial and temporal constraints. Measures of effectiveness are developed against which the "randomness" of any path-producing method can reasonably be judged. Previous investigations into the scenario are reviewed and two models are developed, one using a random tour with drift and the other derived from Brownian motion. Statistics generated by Monte Carlo simulations for both models are compared. While the Brownian motion derived process is not always under perfect control of the constraints, if the timed arrival constraint may be slightly violated then that process performs better against the measures of effectiveness and is easier for a target to execute than is the random tour with drift.

Master of Science in  
Operations Research  
March 1983

Advisor: D. P. Gaver  
Department of  
Operations Research

REVISION TO MILITARY STANDARD 414, SAMPLING  
PROCEDURES AND TABLES FOR INSPECTION BY  
VARIABLES FOR PERCENT DEFECTIVE

Donald P. Cook  
Lieutenant, United States Navy  
B.S., University of Utah, 1976

This thesis recommends certain changes in the procedures and formatting of Military Standard 414 (Sampling Procedures and Tables for Inspection by Variables for Percent Defective) to bring its presentation in parallel with Military Standard 105D (Sampling Procedures and Tables for Inspection by Attributes) and to make the variables standard easier to use.

The procedural changes involve eliminating the Form 1 procedure from the present standard and eliminating the average range method of estimating the lot standard deviation. The format changes involve relabeling the inspection levels, regrouping the lot size ranges, and relabeling the sample size code letters. Additions to the switching procedures for tightened and reduced inspection are also suggested.

Master of Science in  
Operations Research  
September 1983

Advisor: G. F. Lindsay  
Department of  
Operations Research

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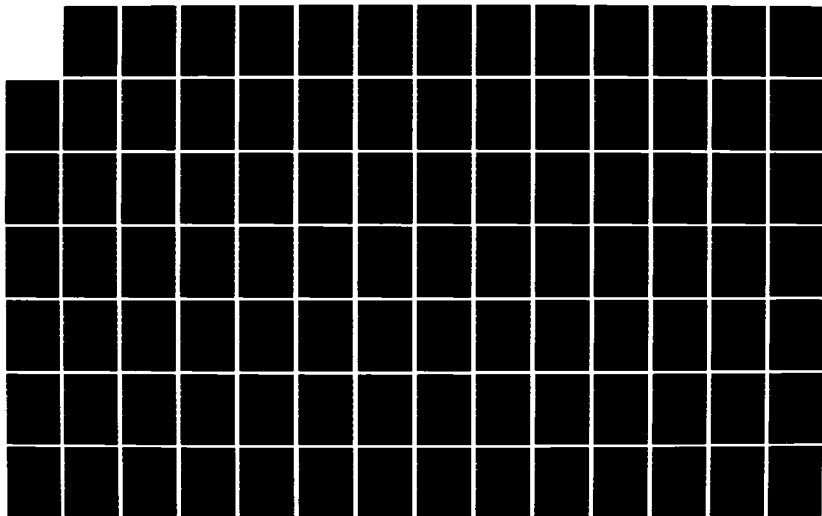
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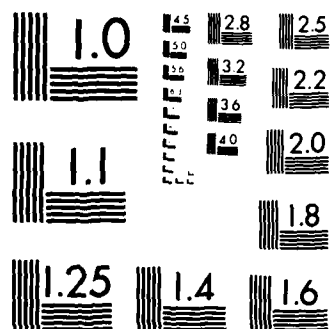
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963-A

## A SMALL-UNIT AMPHIBIOUS OPERATION COMBAT MODEL

James Madison Crites  
Captain, United States Marine Corps  
B.S., University of Illinois, 1976

This thesis develops a Lanchester-type force-on-force combat model simulating small-unit amphibious operations. The model commences with a ship-to-shore assault of aggressor forces mounted onboard Landing Vehicle Assault craft moving against a defensive force ashore. Once the ship-to-shore phase of combat is completed, the model continues to simulate land combat further inland between the assaulting aggressor forces and other defensive forces occupying key terrain.

The main thrust of the thesis is to alleviate some of the problems associated with the inherent abstractness of Lanchester-type combat models; specifically, to develop "user-friendly" input-data and output structure, and more thorough documentation of the model's algorithms to provide a model which would be more easily understood and utilized by students of combat modeling.

Master of Science in  
Operations Research  
March 1983

Advisor: J. G. Taylor  
Department of  
Operations Research

## AN ANALYSIS PLAN FOR THE ARCOMS II EXPERIMENT

Emilio Di Giorgio  
Captain, United States Army  
B.S., United States Military Academy, 1974

The purpose of this thesis is to examine and recommend methodologies that will support the analysis of the ARCOMS II field experiment. This is done in three parts. The first is to determine the methods with which to analyze the experimental effects and interactions. This is followed by a discussion of data analysis techniques for representing the data. Thirdly, an examination of the techniques for determining the significance of certain questions relating to the Armor Combat Process is discussed.

Master of Science in  
Operations Research  
June 1983

Advisor: T. Jayachandran  
Department of  
Operations Research



AN APPLICATION OF THE NAVSTAR GLOBAL POSITIONING SYSTEM IN  
NAVIGATION TRACK RECONSTRUCTION FOR NAVAL EXERCISES

Don Waymon Driskill  
Lieutenant, United States Navy  
B.S.E.E., University of Oklahoma, 1977

This study investigates an application of the Navstar Global Positioning System (GPS) in Naval Exercise reconstruction. It examines the feasibility of combining Navstar GPS, via Naval Tactical Support Activity (NTSA) data collection methods, with the Mini-Reconstruction System (MRS), a portion of the Tactical Information Management System (TIMS). The study describes Naval exercise reconstruction in general. It describes the Mini-Reconstruction System and exercise reconstruction using this system. Navstar GPS is described in detail. The methodology and the theoretical background for this application is discussed. Finally, the impact of GPS input on exercise reconstruction is examined in a comparison of operational characteristics of competitive navigation systems.

Master of Science in  
Operations Research  
September 1983

Advisor: R. H. Shudde  
Department of  
Operations Research

SIMTBED A GRAPHICAL TEST BED FOR ANALYZING AND REPORTING THE  
RESULTS OF A STATISTICAL SIMULATION EXPERIMENT

Hans-Walter Drueg  
Major, German Air Force  
Ing. (grad.), Hochschule der Bundeswehr Muenchen, 1974

A graphical test bed in which the results of a simulation experiment can be reported and analyzed is described. The test bed is based on the regression adjusted graphics and estimation methodology developed by Heidelberger and Lewis [Ref. 1] for regenerative simulation. From the graphics and associated numerics, the experimenter can summarize and see simultaneously relative properties, such as bias, normality and standard deviation, of several estimators of a characteristic of population for up to 8 sample sizes. The evolution of these properties with sample size is also displayed. The graphics is supported on a line printer to make it and the program portable. The technique is illustrated by examples concerning the effects of changes in data distribution on the behavior of the lag one serial correlation coefficient, the estimation of the shape parameter of Gamma random variables and a comparison of different methods (jackknife, bootstrap) for estimating the standard error of an estimator.

Master of Science in  
Operations Research  
September 1983

Advisor: P. A. W. Lewis  
Department of  
Operations Research

COMPARISON OF WAYS TO USE WEIGHTED FACTORS FOR DEVELOPING  
VEHICLE SCHEDULES IN A MASS TRANSIT SYSTEM

Roger Alan Duguid  
Lieutenant Commander, United States Navy  
B.A., Washburn University of Topeka, 1972

Traditionally, fleet vehicle schedules for mass transit systems are determined by using a minimum cost flow model. However, with constraints such as an upper bound on the number of lines that a vehicle can service in a vehicle block, the minimum cost flow structure is lost. Two heuristic procedures, a matching-based procedure and a time increment procedure, are developed for scheduling a fleet of vehicles under these additional constraints. These procedures attempt to minimize the average number of lines a vehicle block will traverse while maintaining a high average number of trips per vehicle schedule, low deadhead and waiting times and a minimum number of vehicles to service a timetable. Both procedures minimize a weighted sum cost function and have been tested on two databases including the Monterey-Salinas Transit system in California. Solutions comparable to the present vehicle schedules for the Monterey-Salinas Transit system were obtained using these procedures.

Master of Science in  
Operations Research  
March 1983

Advisor: L. K. Bodin  
Department of  
Operations Research

A COMPARISON OF TWO EXTENDED KALMAN FILTER ALGORITHMS  
FOR AIR-TO-AIR PASSIVE RANGING

Ward Hubert Ewing  
Commander, United States Navy  
B.S., North Dakota State University, 1966  
M.S., University of Southern California, 1978

Two Extended Kalman Filter algorithms for air-to-air passive ranging are proposed, and examined by computer simulation. One algorithm uses only bearing observations while the other uses both bearing and elevation angles. Both are tested using a flat-Earth model and also using a spherical-Earth model where the benefit of a simple correction for the curvature-of-the-Earth effect on elevation angle is examined. The effects of varied angle measurement precision and of varied range estimate accuracy are investigated. Both filters are found to perform acceptably under most conditions, with the bearing-elevation algorithm generally providing superior results.

Master of Science in  
Operations Research  
September 1983

Advisor: J. N. Eagle  
Department of  
Operations Research

A SIMULATION MODEL OF TACTICAL NUCLEAR TARGET  
ANALYSIS AND DAMAGE ASSESSMENT

Joseph Carl Fernandez  
Captain, United States Army  
B.S., San Diego State University, 1970

This thesis presents a Nuclear Targeting and Effects program that is intended for inclusion in the Simulation of Tactical Alternative Responses (STAR) combat model. It is presented as a stand alone program, written in SIMSCRIPT, which can be easily modified as a subroutine for any high resolution combat model requiring tactical nuclear effects simulation. When presented with a group of targets which are deemed suitable for attack by tactical nuclear weapons, the program will select units to fire, select proper yields for multiple yield weapon systems and assess casualties among Armor and Infantry within the target area.

Master of Science in  
Operations Research  
June 1983

Advisor: J. Hartman  
Department of  
Operations Research

THE APPLICATION OF FAULT TREE ANALYSIS  
TO AN ANTI-AIRCRAFT WARFARE MODEL

Thomas John Flaherty  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

Fault Tree Analysis is a method implemented through the use of logic symbols, for analyzing either qualitatively or quantitatively the events that lead to a mission or system failure. This work examines an Anti-Aircraft Warfare (AAW) scenario restricted to the defense of an aircraft carrier. A fault tree of the events that lead to a hit on the carrier is displayed logically from the top down. Fault tree analysis when applied to the AAW model is examined with a view toward its usefulness as an instructional and predictive tool.

Master of Science in  
Operations Research  
September 1983

Advisor: J. D. Esary  
Department of  
Operations Research

NEAR-OPTIMAL FINITE SOLUTIONS TO THE THREE AND  
FOUR STEP DISCRETE EVASION GAMES

Scott W. Goodson  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

A review of discrete pursuer-evader games and known solutions is presented. A method is given for obtaining a finite memory, near optimal evader strategy for the three-step game, which greatly reduces data storage requirements from previous near-optimal strategies. Additionally near-optimal evader strategies for the four-step game are discussed.

Master of Science in  
Operations Research  
September 1983

Advisor: J. N. Eagle  
Department of  
Operations Research

OPTIMAL SEARCH FOR THE WAKE OF A MOVING TARGET  
WHEN SEARCHER MOTION IS CONSTRAINED

Douglas B. Guthe, Jr.  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

A method for determining the optimal or near-optimal search path for the wake of a moving target when the searcher's motion is constrained is presented. The problem uses a Markov motion model in discrete time and space for the target and assumes that the searcher is constrained to move only from the currently occupied cell  $j$  to a specified set of "neighbor cells",  $I(j)$ . First, a discussion of the complexity of the problem is presented. Next, an extension of T. J. Stewart's constrained searcher algorithm is given. Stewart's algorithm uses S. S. Brown's unconstrained searcher algorithm to calculate bounds on the probability of nondetection. An extension of Brown's algorithm to allow the use of a wake detector is also given. Several alternatives to both algorithms are offered and compared. Finally, some further extensions to the algorithms are suggested.

Master of Science in  
Operations Research and  
Computer Science  
September 1983

Advisor: J. N. Eagle  
Department of  
Operations Research



ARTIFICIAL DISPERSION OF AIM POINT  
FOR ARTILLERY FIRE

Gwang Hee Ha  
Lieutenant Colonel, Korean Army  
B.S., Republic of Korea Military Academy, 1970

This thesis examines the problems of optimal aiming at an imperfectly located point target and an area target in which elements are uniformly or normally distributed. For an analytical simplicity, a two-dimensional target is considered and optimal aim points are determined when 2 rounds are fired.

Master of Science in  
Operations Research  
March 1983

Advisor: J. G. Taylor  
Department of  
Operations Research

ANALYSIS OF INVENTORY MODELS  
WITH BUDGET CONSTRAINTS

Sung Jin, Kang  
Major, Republic of Korea Army  
B.S., Republic of Korea Military Academy, 1974

This thesis addresses the problem of determining the optimal number of spares for a multi-item inventory system with a procurement budget constraint. Various inventory models are considered with objective functions like time-weighted units short, units short, essentiality-weighted units short and pseudo-availability. Solution algorithms are derived using the generalized Lagrange multiplier approach and a marginal analysis approach.

Sample data and output results are provided and comparisons of the alternative models are given. Finally, a discussion and example is given of the use of the models as a means of estimating the budget required to attain a specified level of performance.

Master of Science in  
Operations Research  
September 1983

Advisor: F. R. Richards  
Department of  
Operations Research

AN EMPIRICAL ANALYSIS OF THE DECISION TO  
ENTER MILITARY SERVICE BASED ON  
AGE AT SERVICE ENTRY

Ronald W. Stanley  
Captain, United States Army  
B.S., University of Arizona, 1973

This study investigates the relationship of entry age to various data concerning enlistees' individual characteristics and family background, educational background, civilian labor force experience, recruiting process, and enlistment characteristics and perceptions. Data collected in the 1979 Department of Defense Survey of Personnel Entering Military Service were stratified into nine age cohorts according to age at entry into active military service and examined primarily using the technique of multiple classification analysis.

Analysis indicated that recruitment of a larger percentage of older age individuals should significantly improve the quality of enlistees. Analysis also revealed entry age relationships that could impact on personnel costs and recruiting programs.

Master of Science in  
Operations Research  
June 1983

Advisor: G. W. Thomas  
Department of  
Operations Research

AN INVESTIGATION OF LONG TERM ACQUISITION COST  
GROWTH RATES OF UNITED STATES NAVY SHIPS

Douglas Arthur Smartt  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1971

This study is a basic exploration of the validation and limitations of forecasting the future Navy based on historical growth trends. It addresses the long term relationships between fleet dollar value, fleet tonnage, fleet manning and fleet electrical generating capacity disaggregated by classes and types of vessels in the U.S. Navy. This study presents three methods by which four aggregated growth rate relationships of United States Navy Ships may be estimated and compared. The four proportional growth rates studied are unit (ship) per acquisition dollar, tonnage per dollar, electrical generating capacity per dollar, and crew-member per dollar. The three historical growth rate computations are analyzed using four different weighting factors. Although growth rates are simplistic in concept, aggregation of the non-homogeneous collection of diverse units which compose the United States Navy provides interesting results.

Master of Science in  
Operations Research  
March 1983

Advisor: M. G. Sovereign  
Department of  
Operations Research

A COMPUTER PROGRAM TO MODEL PASSIVE ACOUSTIC ANTISUBMARINE  
SEARCH USING MONTE CARLO SIMULATION TECHNIQUES

Steven Gregory Slaton  
Lieutenant Commander, United States Navy  
B.S., University of California, Berkeley, 1970

A computer program (written in FORTRAN) is presented which uses Monte Carlo techniques to simulate one-searcher, one-target passive acoustic ASW search that terminates at detection. A threshold crossing detection model is used, and stochastic variations in the acoustic signal are modeled using either a Lambda-Sigma Jump or Gauss-Markov error process. Both platforms have the capability of detecting each other, and area and barrier searches are modeled. Features of the program include interactive data input, extensive use of graphical displays, and thorough statistical analysis of the results of the simulation.

Master of Science in  
Operations Research  
September 1983

Advisor: J. N. Eagle  
Department of  
Operations Research

## A MATHEMATICAL MODEL FOR OXYGEN TOXICITY IN MAN

Larry Wayne Simmons  
Lieutenant Commander, United States Navy  
B.A., Ohio State University, 1973  
M.S., National University, 1980

In this thesis, mathematical models are established for the development of oxygen toxicity in divers. The study endeavors to derive the shape of the oxygen tolerance curve in terms of depth-time limitations by statistical analysis of existing data. By assuming a known distribution for the time-to-serious-symptom, mathematically predictive models are developed which allow a greater degree of predictability in mission profiles and allow the associated risk to divers to be evaluated.

Master of Science in  
Operations Research  
September 1983

Advisor: J. Taylor  
Department of  
Operations Research

AN ANALYSIS OF COLA ALLOCATION WITHIN  
THE UNITED STATES COAST GUARD

Kevin G. Ross  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1978

A model is developed for the allocation of a known fixed-amount of money to various financial accounts. Market baskets were defined for each of the accounts and models were developed to calculate estimated inflation rates for each account. These inflation rates were then used as inputs into the allocation model. The proposed allocation model distributed the funds to the accounts in a manner such that each account received an equal percentage of its cost of living increase.

Master of Science in  
Operations Research  
September 1983

Advisor: P. M. Carrick  
Department of  
Administrative Sciences

AN IMPROVED SEARCH AND SCAN TECHNIQUE FOR  
SHORT RANGE AIR DEFENSE CREWMEN

Gregory Hugh Parlier  
Captain, Air Defense Artillery, United States Army  
B.S., United States Military Academy, 1974

U.S. Army Short Range Air Defense (SHORAD) systems require visual detection of threatening aircraft prior to initiating engagement procedures. This thesis evaluates alternative visual search techniques which employ scan patterns derived from an understanding of SHORAD capabilities, the tactical air threat, and human visual search phenomena. An experiment was conducted to determine the overall effectiveness of each technique. Analysis of experimental data suggests that one pattern is significantly more effective than other patterns currently in use. Recommendations are also made to improve SHORAD visual search effectiveness by adoption specific training programs.

Master of Science in  
Operations Research  
June 1983

Advisor: S. J. Paek  
Department of  
Operations Research



## NONPARAMETRIC STATISTICS TEST SOFTWARE PACKAGE

Phillip J. O'Brien, Jr.  
Major, United States Marine Corps  
A.B., Stanford University, 1972

This thesis provides the computer software to perform 24 of the most common nonparametric tests, and a text explaining how and why to use that software.

Nonparametric tests are valuable to experimenters and operations analysts for three reasons: ease of explanation to non-statisticians, simplicity of computation, and applicability to data sets which cannot be analyzed by parametric tests. Reasons for unsuitability of parametric test include data of nominal or ordinal level of measurement, lack of common variance, or lack of normal distribution of the underlying population.

There are two programs provided: Lochinvar, an interactive Pascal program, and Chrunch, a Fortran program. Lochinvar is designed to prompt and screen a user's entry of data and options. Chrunch performs calculations; it is suitable for use in whole or part as a subcomponent of other programs.

Master of Science in  
Operations Research  
September 1983

Advisor: S. J. Paek  
Department of  
Operations Research

## A METHODOLOGY FOR DETERMINING TRAINING EVENT COST

John Daniel Obal  
Captain, United States Army  
B.A., University of Nebraska, 1974

This thesis examines the two current Army methodologies, BTMS and TMACS, for planning and costing unit training events. In the process of examining the methodologies, this thesis reviews categories of training and the development of equipment operating cost factors. An additional training resource control scheme, the Jaehne model, is also presented. A model based on regression techniques is developed for determining the cost of battalion training events. Conclusions are drawn on the applicability and promise of the model. This thesis presents an additional training resource management procedure for use at battalion level.

Master of Science in  
Operations Research  
June 1983

Advisor: S. J. Paek  
Department of  
Operations Research

## A RETAIL LEVEL INVENTORY MODEL FOR NAVAL AVIATION REPAIRABLE ITEMS

Mark Leonard Mitchell

Lieutenant Commander, Supply Corps, United States Navy  
B.S., Massachusetts Institute of Technology, 1972

The inventory model used by the U.S. Navy for aviation repairable items was analyzed and found to be deficient in two major areas. The method in which input data is used is found to be overly conservative. The underlying theoretical model was identified as an M/M/∞ queueing model. The assumption of unlimited repair capacity in this model is not valid for application to Navy maintenance activities.

An alternate inventory model is developed which substantially improves on these deficiencies. The proposed model theorizes two parallel repair processes differentiated by the existence or absence of awaiting parts time. Each of the repair processes is modelled with an M/M/1 queueing model.

Simulation with data obtained from the USS RANGER 1983 deployment supports the contention that the proposed model does a superior job of estimating inventory requirements.

Master of Science in  
Operations Research  
March 1983

Advisor: F. R. Richards  
Department of  
Operations Research

# SCREENOP: A COMPUTER ASSISTED MODEL FOR ASW SCREEN DESIGN

William Joseph Mickler, Jr.  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1977

This thesis is a description of the Naval Postgraduate School's version of the ASW screen optimization program, SCREENOP, created by Daniel H. Wagner, Associates. The program is written in Fortran 77 and runs on a VAX 11/780 computer using a TEKTRONIX 4014 graphics terminal. The program models and optimization technique are described. A user's guide with an example is provided in the thesis. Modifications to the SCREENOP program are also proposed.

Master of Science in  
Operations Research  
September 1983

Advisor: A. F. Andrus  
Department of  
Operations Research

MASK: A TACTICAL AID FOR PLANNING AIR STRIKES  
AGAINST RADAR DEFENDED LAND TARGETS

Dana Bruce McKinney  
Commander, United States Navy  
B.A., University of California, Berkeley, 1969

This thesis presents an interactive computer program called MASK which generates radar and optical line-of-sight coverage envelopes based on terrain masking and refractive propagation effects. MASK is designed primarily as an aid in planning air strikes against radar defended land targets and has additional applications to air defense network planning. A large digital terrain data base provides extensive coverage of potential areas of interest to the tactical planner.

Center of Science in  
Operations Research  
Summer 1983

Advisor: A. F. Andrus  
Department of  
Operations Research

COST ESTIMATION AND PRODUCTIVITY IMPROVEMENT WITHIN  
THE DEPOT MAINTENANCE ACTIVITY

Robert Dean Larson  
Captain, United States Marine Corps  
B.S., United States Naval Academy, 1974

Equipment readiness is an essential component in maintaining the Marine Corps as this country's "Force in Readiness". In today's environment of austere funding, improved productivity and reliable budgeting processes are critical elements within the Depot Maintenance Activities. The optimal utilization of available resources is paramount to the enhancement of Fleet Marine Forces equipment readiness. This thesis used the quantitative techniques of multiple linear regression, survey analysis and linear programming in an effort to model an automated management system for the maximum allocation of resources at the two existing Marine Corps depots.

Master of Science in  
Operations Research  
March 1983

Advisor: J. G. Taylor  
Department of  
Operations Research

A COMPARISON OF AUDIO, VISUAL, AND TACTILE WARNING DEVICES  
IN A SIMULATED SLIGHT ENVIRONMENT

Robert Joseph Larkin  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1971

An experiment was performed in which fifteen subjects responded to three separate warning devices; an audio, visual, and tactile device. Reaction times to each randomly presented device were measured while each subject was simultaneously engaged in piloting a personal flight simulator. Instructions to the subjects were continually presented visually on a TV monitor and verbally through a set of earphones. The mean reaction times for each device were compared using a difference of means t-test. The results showed that the tactile device produced significantly faster reaction times at the  $\alpha = .01$  significance level. This led to the conclusion that a tactile warning device could be effective in a flight environment where visual and auditory senses can easily be overloaded.

Master of Science in  
Operations Research  
March 1983

Advisor: D. E. Neil  
Department of  
Operations Research

DESCRIPTION AND ANALYSIS OF PACAM V (PILOTED AIR COMBAT ANALYSIS  
MODEL) AS A TACTICAL DECISION AID WITH A  
USER'S GUIDE FOR OPERATION AT NPS

Douglas Michael Kelly  
Lieutenant, United States Navy  
B.A., State University of New York at Geneseo, 1975

The increasing cost of a through flight test of new fighter air-to air tactics and equipment has made the use of simulation computer models to assist in this process desirable. This study presents an analysis and description of PACAM V (Piloted Air Combat Analysis Model). PACAM V is a computer model developed to assist in the evaluation of aircraft, armament, and tactics by simulating the performance of aircraft and weapons in combat. The PACAM damage models for the computation of aircraft probability of kill are analyzed and suggestions for improvement are made. An interactive User's Manual for operation of the model on the IBM-3033 computer at the Naval Postgraduate School is presented.

Master of Science in  
Operations Research  
September 1983

Advisor: R. Ball  
Department of  
Aeronautics



ANALYSIS OF THE NAVAL WARFARE GAMING SYSTEM'S  
SURFACE-TO-AIR MISSILE ROUTINE

Dennis Thomas Stokowski  
Lieutenant, United States Navy  
B.S., Southeastern Massachusetts University, 1976

This thesis is an examination of the surface-to-air missile engagement model in the Naval Warfare Gaming System installed at the Center for War Gaming, Naval War College, Newport, Rhode Island. Flow charts derived directly from the computer code are included. The intent is to verify the computer code with pertinent documentation as well as to determine its realism in modeling actual surface-to-air missile engagements. Modifications to the Naval Warfare Gaming System surface-to-air model are proposed.

Master of Science in  
Operations Research  
September 1983

Advisor: A. F. Andrus  
Department of  
Operations Research

AN ANALYSIS OF DEMAND FORECASTING  
EMPHASIZING INVENTORY EFFECTIVENESS

Nicholas Martin Sullivan  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Villanova University, 1973

An analysis is made of the Navy's demand forecasting process and its impact on inventory system effectiveness. The current Navy Uniform Inventory Control Point (UICP) forecasting model is compared with an alternative computer-oriented technique using UICP data. The comparison highlights the presence of highly erratic patterns in the UICP demand data base. Next, a simulation model is exercised to suggest how the UICP demand reporting method might contribute to the variance of recorded demand. The thesis concludes with another simulation indicating the relation of demand forecasting accuracy on each component of total inventory cost. This simulation suggests that, while holding and ordering costs remain relatively insensitive to fluctuations in forecast accuracy, the stockout cost element displays a hypersensitive reaction.

Master of Science in  
Operations Research  
September 1983

Advisor: F. R. Richards  
Department of  
Operations Research

A MICROCOMPUTER BASED GENERAL LINEAR  
PROGRAMMING OPTIMIZATION PACKAGE

Donald W. Theune  
Major, United States Marine Corps  
B.A., Lakeland College, Sheboygan, WI, 1978

The importance of mathematical models as tools in decision making has motivated increased interest in that theory and its implementation. This paper describes fundamental techniques of linear programming which have been combined to offer a microcomputer based optimization package. The package is machine portable and will accept input from files created by other programs. Thus the package affords the opportunity to build a mathematical programming system based on its ability to solve bounded variable linear subproblems. Written in JRT PASCAL 3.0 and implemented on a portable, 8-bit microcomputer (KAYPRO-II), this package places the fundamental tool of optimization in the office, classroom and home.

Master of Science in  
Operations Research  
September 1983

Advisor: G. G. Brown  
Department of  
Operations Research

COMBINING A LEVEL OF REPAIR MODEL WITH AN  
AVAILABILITY CENTERED PROVISIONING MODEL  
FOR LOGISTIC SUPPORT ANALYSIS

Henry J. Watras  
Lieutenant, United States Navy  
B.A., Ohio Wesleyan University, 1976

This thesis is a study into expected system operational availability as a function of level of repair (LOR) and system spares provisioning. The maintenance and repair cycle for most systems is discussed with concentration on the Navy MIL-STD-1390B Naval Air Systems Command Equipment model (AIR) which determines the life support cost for various LOR policy alternatives. The thesis then demonstrates how the Navy's Availability Centered Inventory Model (ACIM) may be used to determine the least cost provisioning policy to obtain a desired level of system operational availability for the specified LOR policy in a multi-echelon operation and support organization.

Master of Science in  
Operations Research  
September 1983

Advisor: M. B. Kline  
Department of  
Administrative Sciences

## A PERSISTENT CHEMICAL EFFECTS MODEL

Mark Arthur Youngren  
Captain, United States Army  
B.S., Michigan State University, 1976

This thesis presents a high-resolution stochastic combat simulation model which will simulate the effects of a persistent chemical agent attack on a ground force unit. The model is suitable for inclusion in simulations which are capable of tracking individual soldiers and delivery munitions, and can provide explicit ground and air agent concentrations.

This model will simulate the immediate measures taken by a soldier in response to a direct or indirect persistent chemical agent threat, such as masking, donning protective clothing, immediate decontamination, and first aid. It will compute the dosages received from multiple agents. These actions are performed in response to probabilities and probability distributions which are inputs to the model.

This thesis includes an implementation of the model written in the SIMSCRIPT II.5 programming language for inclusion in the Simulation of Tactical Alternative Responses (STAR) model.

Master of Science in  
Operations Research  
June 1983

Advisor: J. K. Hartman  
Department of  
Operations Research

## AAW FIREPOWER INDEXING FOR NAVAL COMBATANTS

Alan Douglas Zimm  
Lieutenant Commander, United States Navy  
B.S., University of California Los Angeles, 1972

A simulation is developed (Linear Anti-ship Missile Air Defense Simulation, or LASMADS) which models ship defenses under ASCM attack. Using this simulation, a firepower index is developed for current naval ships. The firepower index is used in a deterministic model which predicts the results of the ASCM-surface ship engagement, and is responsive to the most important attack and defense characteristics and variables. Uses of firepower indexes as an operational planning tool is discussed.

Master of Science in  
Operations Research  
September 1983

Advisor: W. Hughes  
Department of  
Operations Research

**MASTER OF SCIENCE**  
**IN**  
**PHYSICS**

ANALYSIS OF LASER TURBULENCE UTILIZING A VIDEO TAPE  
RECORDER AND DIGITAL STORAGE OSCILLOSCOPE

John H. Connor, Jr.  
Lieutenant Commander, United States Navy  
B.S., North Carolina State University, 1973

The ability to measure and predict atmospheric turbulence affecting laser beam propagation is a major concern when considering military applications. Such a method using a telescope, high resolution television camera, video tape recorder, digital storage oscilloscope, and calculator system has been devised, tested and utilized. A laser beam signal is recorded on video tape for further processing. This signal is displayed, stored and digitized using a Tektronix 468 digital storage oscilloscope. The digitized signal is sent to a Hewlett-Packard 9825 computing system for Fourier transform analysis and determination of the refractive index structure constant,  $C_n^2$ . Several trials were conducted using He-Ne and Ga-As lasers. The results demonstrated good correlation with theoretical predictions as well as previously analyzed data.

Master of Science in  
Physics  
December 1982

Advisor: E. A. Milne  
Department of  
Physics



MEASUREMENTS OF DIRECT PATH AND FOLDED PATH OPTICAL  
SCINTILLATION PATH WEIGHTINGS

Alfred Guy Costantine  
Captain, United States Army  
B.S., United States Military Academy, 1973

A theoretical prediction by Dr. Avihu Ze'evi of the relative contribution to the optical scintillation by different points along the path was described by a weight function for direct and exact folded path spherical wave sources. In an effort to verify this prediction a turbulence chamber was built to allow a controlled turbulence source to be moved and measured at different path positions in conjunction with scintillation measurements. The experimental results follow Dr. Ze'evi's general pattern but both sources are less weighted at the detector end than predicted and the folded path is more heavily weighted at the target end than predicted.

Master of Science in  
Physics  
June 1983

Advisor: E. A. Milne  
Department of  
Physics

COHERENCE STUDIES OF GEOMAGNETIC FLUCTUATIONS  
IN THE FREQUENCY RANGE .05 TO 10 Hz

Joseph Timothy Fisher  
Lieutenant Commander, United States Navy  
B.A., University of South Florida, 1972

Fluctuations in the horizontal component of the earth's magnetic field were measured at a land site (La Mesa) and on the floor of Monterey Bay at a depth of 70 meters. The measurements span a 19-hour period (August 17/18, 1982). Assuming a circular polarization basis set, analysis was conducted to determine the coherence between the two sites in the frequency range .05-10 Hz. Preliminary analysis indicates a high degree of coherence from .05-.4 Hz. Also, a study of the polarization of the micropulsation field at each site was conducted in terms of Stokes parameters.

Master of Science in  
Physics  
December 1982

Advisor: O. Heinz  
Department of  
Physics

## WEIGHTING FOR THE MODULATION TRANSFER FUNCTION

Robert J. Flenniken  
Lieutenant Commander, United States Navy  
B.S., University of Colorado, 1973

The effects of turbulence on the performance of imagers or on beam forming optical systems are well expressed by the optical transfer function (OTF) or its magnitude, the modulation transfer function (MTF). It has been shown that the MTF can be expressed in terms of the Fried model by means of a single number, the turbulence structure constants for optical index,  $C_n^2$ , provided that a properly path weighted value is obtained. Based on current theory the weighting needed in the path-position weighted value of  $C_n^2$  is a function of  $(Z/Z_0)^{5/3}$ , heavily emphasizing the region near the imaging system or beam forming optics. It is the conclusion of this report, that the path weighting function  $(Z/Z_0)^{5/3}$  is correct.

Master of Science in  
Physics  
June 1983

Advisor: E. A. Milne  
Department of  
Physics

## OCEAN FLOOR GEOMAGNETIC DATA COLLECTION SYSTEM

Arnold Richard Gritzke  
Lieutenant Commander, United States Navy  
B.S., University of Utah, 1972

Robert Henry Johnson, II  
Lieutenant, United States Navy  
B.S., University of Washington, 1976

The second generation design of the Naval Postgraduate School's ocean floor geomagnetic data collection system is described with emphasis on modifications for improvement over its predecessor. These improvements include 15 channel parallel analog-to-serial pulse code modulation conversion, fiber optic data link, and radio telemetry to shore recording equipment. The system has flexibility in operating depth, an increase in data acquisition time, synchronization with land site data, and a data format that is readily converted to digital for computer assisted analysis.

Master of Science in  
Physics  
December 1982

Advisor: J. Powers  
Department of  
Electrical Engineering

A COMPUTER PROGRAM FOR SOLVING THE PARABOLIC EQUATION USING AN  
IMPLICIT FINITE-DIFFERENCE SOLUTION METHOD AND  
INCORPORATING EXACT INTERFACE CONDITIONS

Larry Ernest Jaeger  
Lieutenant, United States Coast Guard  
B.S., University of Wisconsin-Madison, 1973  
M.S., University of Wisconsin-Madison, 1974

An Implicit Finite-Difference (IFD) program that incorporates exact interface conditions has been developed for solving the parabolic equation. The model preserves continuity of pressure and continuity of the normal component of particle velocity at the interface between media having different sound speeds and densities. Interface conditions are preserved for horizontal and sloping interfaces along a user-specified bottom profile. Test cases are included to demonstrate the use of the model.

Master of Science in  
Physics  
September 1983

Advisor: A. B. Coppens  
Department of  
Physics

THERMAL COUPLING AND DAMAGE MECHANISMS OF 1.06 MICRON LASER  
RADIATION AND LASER-PRODUCED PLASMA ON SELECTED MATERIALS

Williams Frost Jenkins  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

William Richard Schmidt  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1970

Thermal coupling and plasma-induced surface damages were investigated for selected target materials to determine the correlation between the two phenomena. A review of thermal coupling and unipolar arcing, along with reference to the physical properties of the target materials involved, provided the basis on which this study was conducted. Target materials investigated included aluminum and stainless steel, both with polished, unpolished, and Si-coated surface preparations, as well as TiC-coated stainless steel. The experiments were conducted in a  $10^{-6}$  torr. vacuum using a neodymium-glass laser in the Q-switched mode.

For uncoated targets, a direct correlation exists between thermal coupling and the percent of irradiated surface experiencing breakdown. For coated targets, thermal coupling is dependent on coating thickness and smoothness. Silicon and TiC-coated targets are found to experience unipolar arcing damage.

Master of Science in  
Physics  
December 1982

Advisor: F. R. Schwirzke  
Department of  
Physics

THE DEVELOPMENT OF A DECISION AID FOR PASSIVE ACOUSTIC  
LOCALIZATION USING KNOWLEDGE OF THE ENVIRONMENT

George M. Vermillion  
Lieutenant, United States Navy  
B.S., University of Utah, 1976

This thesis describes four microcomputer programs for evaluating sonobouy effectiveness. The programs are based on the Gaussian signal excess model. The first program can be used to compare different sonobouy employments, for example, a comparison between deep and shallow hydrophone depths. The second program gives a user the opportunity to display the effective extent of his pattern. The third program provides localization information using a bouy pattern and contact status. The program is based on a model that uses both positive and negative information from a field of sonobouys to estimate target position; and is designed to give the operator an indication of where to deploy additional sonobouys in order to convert single bouy to multiple bouy contact. Topographic mapping procedures are used to display the information in a graphical format that could prove useful to antisubmarine warfare aircrews.

Master of Science in  
Systems Technology (ASW)  
March 1983

Advisor: R. N. Forrest  
Department of  
Operations Research

## A DIGITAL FILTER REPRESENTATION OF THE ASQ-81 MAGNETOMETER

Michael Charles Huete  
Lieutenant, United States Navy  
B.S., Tulane University, 1976

A digital filter representation of the ASQ-81 magnetometer is derived from the s-plane transfer functions of the system through the use of a bilinear transformation. A FORTRAN computer program is written which applies this representation to time-sampled total magnetic field data in order to obtain a time series representation of ASQ-81 filtered total field. A series of simulations and a field experiment are conducted which verify the program output. Applications of this program include usage in conjunction with geomagnetic field data in order to produce a new data set representative of geomagnetic noise observed by Navy MAD (Magnetic Anomaly Detection) aircraft with the potential to investigate techniques of reducing geomagnetic noise in MAD aircraft.

Master of Science in  
Systems Technology (ASW)  
September 1983

Advisor: A. R. Ochadlick  
Department of  
Physics



A HORIZONTAL RANGE VS. DEPTH SOLUTION OF SOUND SOURCE POSITION  
UNDER GENERAL SOUND VELOCITY CONDITIONS USING THE  
LLOYD'S MIRROR INTERFERENCE PATTERN

Richard Franklin Hudson  
Lieutenant, United States Navy  
B.S., University of Idaho, 1975

An algorithm is developed which enables the computation of horizontal range and/or depth from a submerged sound source, using the ray acoustics and the Lloyd's mirror interference effect. The solution is based on Snell's law and involves integrating multipath sound rays to find the difference in length between the direct and surface reflected sound paths from the source to the receiver. This difference in path length is directly related to the observed Lloyd's mirror interference pattern.

No assumption as to the mathematical characteristics of the sound velocity profile (SVP) are made nor are far field approximations used. The solution is as accurate as the SVP data input to the problem.

A general computer flow chart and basic language program are provided to allow local commands the capability of premission planning based on specific operating area environmental information.

Master of Science in  
Systems Technology (ASW)  
September 1983

Advisor: C. L. Burmaster  
Department of  
Physics

A LINEAR APPROXIMATION OF THE SOURCE  
POSITION USING MULTIPLE MAD

Wolf-Hubertus Bock  
Lieutenant, United States Navy  
B.A., Rice University, 1975

For certain assumptions, an analysis of multiple MAD signals results in a reasonable estimate for the localization of a target relative to the MAD platform. This is achieved by using selective approximations to linearize an initially nonlinear problem. The simulation ignores noise and requires an estimate of the magnitude of the target magnetic moment components. Results indicate that the best localization estimates are achieved when the platform is on cardinal headings, and when the target moment has a strong vertical component.

Master of Science in  
Systems Technology (ASW)  
September 1983

Advisor: A. R. Ochadlick  
Department of  
Physics

**MASTER OF SCIENCE**  
**IN**  
**SYSTEMS TECHNOLOGY**  
**ANTISUBMARINE WARFARE**  
**(ASW)**

AN ANALYSIS OF A PC-3 MICROPULSATION IN THE  
GEOMAGNETIC FIELD

Kurt B. Stevens  
Captain, United States Air Force  
B.S., United States Air Force Academy, 1979

The Naval Postgraduate School has an ongoing effort to study geomagnetic noise and micropulsations in the ULF frequency range ( $.05 < f < 10$  Hz). Data is collected by three orthogonally mounted coils at a remote land site and telemetered to the laboratory for computer analysis.

To isolate data containing a micropulsation event, time series plots of the magnetic field were generated. The development of a double running average routine made possible the isolation of micropulsations in large data sets. A type PC-3 micropulsation was found and the coherence, ellipticity and polarization properties were determined as follows: Coherence = 0.99, Degree of Polarization = 0.99 and the micropulsation was elliptically polarized.

Power spectral density (PSD) plots summarizing data segments about two hours long occasionally contained structures found to be artificial and not representative of natural phenomena in the geomagnetic field. Methods to avoid this anomalous behavior in PSD plots are suggested.

Master of Science in  
Physics  
June 1983

Advisor: A. Ochadlick  
Department of  
Physics

MEASUREMENTS OF DIRECT PATH AND FOLDED PATH  
OPTICAL SCINTILLATION

Bradford Arthur Speer  
Lieutenant, United States Navy  
B.s., United States Naval Academy, 1976

Frederick Hobbs Parker  
Lieutenant, United States Navy  
B.S., Cornell University, 1975

A theoretical prediction by Dr. Avihu Ze'evi of the correlation between direct path and folded path optical scintillation was developed and published at the Naval Postgraduate School in March 1982. Simultaneously, a method for measuring the scintillation of two laser beams propagating along direct and folded paths was devised and used to record preliminary findings supporting the theoretical work. This system has been improved upon to permit a complete experimental verification of the theory to be attempted outside the laboratory. The experimental results do not support Dr. Ze'evi's theory; however, changing turbulence conditions while measuring the scintillation strength may have been the cause. Further attempts at verification will have to control this factor.

Master of Science in  
Physics  
December 1982

Advisor: E. A. Milne  
Department of  
Physics

CALCULATION OF ATMOSPHERIC TRANSMITTANCE BY  
IBM 3033 COMPUTER CODE LOWTRAN IIIB

Moon-Sik Shin  
Major, Korea Air Force  
B.S., Republic of Korea Air Force Academy, 1973

LOWTRAN IIIB is a FORTRAN computer program for prediction of atmospheric optical transmittance, developed at the U.S. Air Force Geophysics Laboratory (AFGL). LOWTRAN IIIB was received in the modified form developed by Naval Weapons Center China Lake for use on the UNIVAC 1110 computer [Ref. 1], and has now been interfaced to the IBM 3033 computer.

Due to compiler storage limitation in the IBM computer the atmospheric data are read into common storage at the beginning of the program. The two dimensional block data submodule has been replaced with a linear data array, and a new subroutine (array) written to reformat the data. The basic logic structure is unchanged.

Comparisons of NPS LOWTRAN IIIB computations with direct optical extinctions measurement over Monterey Bay and at San Nicolas Island indicate that under these circumstances LOWTRAN IIIB underestimates the extinction due to aerosols while the computer molecular absorption is in substantial agreement with experiment.

LOWTRAN IIIB is presently available as a method of predicting atmospheric transmittance at low resolutions at NPS and is suitable for incorporation in simulations and studies of electro-optic weapon/sensor systems performance.

Master of Science in  
Physics  
June 1983

Advisor: A. W. Cooper  
Department of  
Physics

SUB-BOTTOM HIGH RESOLUTION SONAR UTILIZING NON-LINEAR  
ACOUSTIC PULSE SELF-DEMODULATION

Axel Harry Seeman  
Kapitanleutnant, Federal German Navy  
Graduate, Federal German Naval Academy, 1974

Roy Lance Eyman  
Lieutenant, United States Navy  
B.S., University of New Mexico, 1975

Peter John LeStrange  
Lieutenant, United States Navy  
B.S., Purdue University, 1977

An experiment involving the design and construction of a prototype sub-bottom high resolution sonar system utilizing non-linear pulse self-demodulation and suitable for deep water use is described. It is possible to generate a low frequency wave using the self-demodulation of a short, high frequency, finite amplitude pulse produced by the non-linear properties of the medium. The generated low frequency wave will theoretically have the high directivity of the primary wave while simultaneously possessing the bottom penetrating characteristics of the lower frequency. Measurements demonstrate that the pulse self-demodulation occurs as theoretically predicted, and the results are successfully applied to the design of the sonar system. Shallow water tests demonstrating the potential effectiveness of the sonar system for detection and classification of target objects in bottom sediments are also described.

Master of Science in  
Physics (Seeman)  
December 1982

Advisor: G. L. Sackman  
Department of  
Electrical Engineering

Master of Science in  
Engineering Acoustics (Eyman, LeStrange)  
December 1982

## CERENKOV RADIATION

Ahmet Saglam  
Lieutenant, Junior Grade, Turkish Navy  
B.S.E.E., Naval Postgraduate School, 1981

Cerenkov radiation is calculated for electron beams which exceed the velocity of radiation in a nondispersive dielectric medium. The electron beam is assumed to be bunched as emitted from a travelling wave accelerator, and the emission region is assumed to be finite. Predictions include (a) emission of harmonics of the bunch rate, (b) coherence of radiation at low frequencies, (c) smearing of the emission angle for finite emission regions, (d) explicit evaluation of power spectrum in terms of bunch dimensions. The results of theory are applied to microwave emission from fast electrons in air for different lengths of the air path. Problems encountered during the experiment are discussed and suggestions for continuing work are provided.

Master of Science in  
Physics  
December 1982

Advisor: F. R. Buskirk  
Department of  
Physics



## STIMULATED CERENKOV RADIATION BEAM MONITOR

Kenneth Scott Pugh  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

It has been suggested that many important characteristics of a bunched relativistic electron beam might be determined by monitoring the Cerenkov radiation produced as the beam passes through or very close to a dielectric medium. This report describes an effort to produce stimulated Cerenkov radiation (SCR) in a dielectric slab using a bunched beam of 100 MEV electrons from a linear accelerator. Although the method used displayed only limited success, the results were consistent with previous work and further confirmed the basic ideas regarding SCR production.

In conjunction with the experimental work performed, an analysis was conducted concerning the manner in which various electron charge distributions which might be used to describe how the electron bunches affect the Cerenkov radiation emitted by the beam. In principle, the results imply that proper monitoring of the Cerenkov radiation from a beam should allow one to deduce the total bunch charge and charge distribution.

Master of Science in  
Physics  
June 1983

Advisor: F. R. Buskirk  
Department of  
Physics

EXPERIMENTAL OBSERVATIONS OF GEOMAGNETIC MICROPULSATIONS:  
LAND AND SEA

Edward Wayne Pogue  
Captain, United States Army  
B.S., United States Military Academy, 1971

Data taken from the second generation of the Naval Postgraduate School's ocean floor and land geomagnetic data collection system is analyzed to determine the wave nature of Geomagnetic Micropulsations in the .05 to 10 Hz range. The measurements were made in Monterey, California, during June to September 1982. Three of these experiments were twenty-four hours in length. During two such experiments land and sea data were transmitted to a central point where the signals were recorded simultaneously. Geomagnetic fluctuations were analyzed to determine various factors characterizing the waves. These factors include the power spectral densities, coherences, stokes parameters, orientation angle, degree of polarization and ellipticity. The software developed in this research provides an extensive capability for analysis of geomagnetic noise. Long term data collection can utilize it to establish trends in both the spatial and temporal properties of naturally occurring ELF electromagnetic fields.

Master of Science in  
Physics  
December 1982

Advisor: P. H. Moose  
Department of  
Electrical Engineering

AN INVESTIGATION OF CASCADE ENERGY DENSITY EFFECTS  
USING CLASSICAL TRAJECTORY SIMULATIONS OF  
SPUTTERING BY MOLECULAR IONS

William A. Mason  
Lieutenant, United States Navy  
B.S., University of Utah, 1977

The NPS computer simulation model was modified to study sputtering by molecular ions. The simulations were performed on a Cu(111) surface for normally incident  $O_2^+$  ions at 0.5, 1.25, 2.5, and 5.0 kev/ion. The molecule's angular orientation was both set at specific values and randomly determined. The normalized energy distributions of sputtered atoms for two energy ranges, 0-20 and 0-3 ev/sputtered atom, and the sputtering yield ratios were investigated. The 0-20 ev/sputtered atom energy distributions show distinct peaks at 1.8 ev which are insensitive to incident energy, energy density, and molecular orientation. Simulations indicate that there may be fine structure in the 0-3 ev/sputtered atom range with a cascade interaction unique to molecular sputtering. For a number of molecular orientations which produce very different cascade overlaps, the sputtering yield ratios do not correlate with the degree of overlap. The energy density of a cascade is not an accurate predictor of the sputtering yield ratio.

Master of Science in  
Physics  
June 1983

Advisor: D. E. Harrison, Jr.  
Department of  
Physics

# EXCITATION FREQUENCY DEPENDENCE OF CONDUCTIVITY OF ELECTROLYTIC SOLUTIONS

John Benedict Kolbeck  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1976

The frequency dependence of the electrolytic conductivity was studied for solutions of varying concentrations of NaCl, MgSO<sub>4</sub>, KCl, and KBr. An experimental test fixture was designed and an equivalent electrical model of the test system developed. A theoretical model of the conductivity that accounts for charge carrier inertia is proposed. Measured values of the impedance at various frequencies were used to generate test system model parameters, and subsequently identify sample response. Interpretation of the sample response using the conductivity model allowed determination of the conductivity, which is presented in the form of the D.C. value or real part,  $K_0$  and the non-dielectric time constant,  $T_c$ . The conductivity of the solutions decreased with increasing frequency and the initial measurements of  $T_c$  were of the order of nanoseconds. Variations in  $K_0$  with salinity were in agreement with the empirical formula of Walden.

Master of Science in  
Physics  
June 1983

Advisor: J. R. Neighbours  
Department of  
Physics

**MASTER OF SCIENCE**

**IN**

**SYSTEMS TECHNOLOGY  
COMMAND, CONTROL AND  
COMMUNICATIONS (C3)**

A COMPUTER SIMULATION OF A COMBAT MODEL  
WHICH USES COMMAND AND CONTROL

James E. Bent III  
Captain, United States Air Force  
B.S., North Texas State University, 1971

This thesis provides a student of Command and Control with a computer simulation of a simple Command and Control (C2) model. The simulation is a user-friendly, interactive program with multi-colored, high-resolution graphical displays to illustrate the effect of C2 on a stylized, simple, combat situation. A User's Manual is provided to facilitate the use of the simulation.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: D. P. Gaver  
Department of  
Operations Research

COMMAND CONTROL AND COMMUNICATIONS SYSTEM  
EVALUATION OF DOD

Linda K. Crumback  
Major, United States Air Force  
Grand Valley State College, 1968

This work evaluates the Department of Defense as a command control, and communications (C3) system. The DoD is considered as the black box into which input is received from the President and the output is the actions taken by the nested C3 systems, such as the Secretary of Defense, Joint Chiefs of Staff, the Services, and the operational commands. To evaluate the DoD, the evolution of the DoD, the current organization, and earlier reorganizational studies were researched. The DoD was examined to determine if the weak points states within the studies still exist and, if so, what should be done. In order to design and field C3 systems adequately for the DoD, it must be designed so its lines of command and communication are clear and distinct and the nested systems are combined in the most effective way. A well-designed DoD will reduce the costs and the time to field a C3 system. The conclusion of the paper is that the DoD needs to be reorganized. A plan is presented which provides an organizational structure to eliminate the weak points within the DoD.

Master of Science in  
Systems Technology (C3)  
June 1983

Advisor: C. K. Eoyang  
Department of  
Administrative Sciences

SOME EFFECTS OF STRESS ON USERS OF A VOICE RECOGNITION  
SYSTEM: A PRELIMINARY INQUIRY

Brian Arthur French  
Lieutenant, United States Navy  
B.A., Yale University, 1975

Recent work with Automatic Speech Recognition has focused on applications and productivity considerations in the man-machine interface. This thesis is an attempt to see if placing users of such equipment under time-induced stress has an effect on their percentage correct recognition rates. Subjects were given a message-handling task of fixed length and allowed progressively shorter times to attempt to complete it. Questionnaire responses indicate stress levels increased with decreased time-allowance; recognition rates decreased as time was reduced.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: G. K. Poock  
Department of  
Operations Research



AN ENVIRONMENT FOR DISTRIBUTED SIMULATION  
OF COMMAND AND CONTROL NETWORKS

Richard A. Graham  
Captain, United States Marine Corps  
B.S., The Ohio State University, 1975

This thesis develops a concept for the simulation of command and control networks. The concept is based upon a model of the essential functions of command and control systems and networks of systems. The model is used as the basis for discussion of network performance evaluation, and the performance characteristics of concern form a basis for the simulation architecture. The simulation concept is based upon a distributer simulation capable of utilizing a wide range of network node simulations ranging from manual procedures the manned simulators to fully automated emulators. The simulation is both flexible and transportable due to it's residence within a computer based distributed environment.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: B. Mercer  
Department of  
Computer Science

Master of Science in  
Computer Science  
June 1983

AN INVESTIGATION INTO THE COUPLING OF INTERACTIVE AND BATCH  
NETWORK SERVICES IN COINS

Joanne Bong Soon Kim  
B.A., University of Hawaii, 1966

Networks were conceived in the 1950's, born in the 1960's and grew up in the 1970's. Today they constitute a technology with applications in a myriad of disciplines. Information sharing has been one of the areas greatly aided by computer networks. The Community On-Line Intelligence System (COINS) is an information sharing network in the U.S. intelligence community. COINS offers batch and interactive services which are separate and independent of each other. The information acquisition process has elements of interactive and batch. The design of an information sharing network should provide the foundation to accommodate this two-phased activity. This thesis introduces the concept of collaboration between these autonomous network services, proposes a re-allocation of network capacity in COINS and examines how this new scheme can improve performance and efficiency from a user and managerial perspective.

Master of Science in  
Systems Technology (C3)  
June 1983

Advisor: N. Schneidewind  
Department of  
Computer Science

# IMPACT OF THE WIS MODERNIZATION PLAN ON THE JOINT DEPLOYMENT SYSTEM

Mary McLendon-Koenig  
Lieutenant, United States Navy  
B.S., Armstrong State College, 1978

The Joint Deployment System (JDS) forms the junction among deliberate planning, time-sensitive planning, and the deployment of forces. The WWMCCS Intercomputer Network (WIN) supplies the necessary interconnectivity among the joint deployment community computer systems. In January 1982, the WWMCCS hardware and software and the transfer from the present WWMCCS network system to the Defense Data Network (DDN). Because of proven WIN unreliability, the JDS required site-unique software development to supplement present WIN software.

Individualized application software, integrated with the improved network reliability and survivability of the DDN, will enhance the present C3 system. This thesis demonstrates that the total implementation of the WIS involves additional modifications in site-unique applications, standardized procedures for software development, updated hardware technology, and a multi-level security system.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: L. B. Garden  
Department of  
Electrical Engineering

GRAPHIC ENHANCEMENT OF THE AIRCRAFT PENETRATION MODEL  
FOR USE AS AN ANALYTIC TOOL

Donald F. Motz  
Major, United States Air Force  
B.S., United States Air Force Academy, 1968

The Aircraft Penetration Model (ACPEN) is an event store computer simulation of the interaction between surface-to-air missile sites and airframes attempting to penetrate the defended area. Statistical and event data produced by the model in list and tabular form requires item by item comparison for use in planning and analysis. By using a computer graphics software package to present the data produced by the ACPEN simulation, use of the model as a planning and analytic tool is enhanced. Of particular use is a map graphic product which shows spatial relationships and events. The simulation area displayed and composition of the map can be interactively varied by a planner to meet specific planning needs.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: A. F. Andrus  
Department of  
Operations Research

## COMEL: A COMMUNICATIONS WAR GAME

Katherine Rowe  
Captain, United States Air Force  
B.S., Virginia Polytechnic Institute, 1968  
M.S., University of Northern Colorado, 1976

Robert Cecil Allgood, Jr.  
Captain, United States Air Force  
B.S., United States Military Academy, 1976

COMEL is a communications oriented war game developed by the Joint Telecommunications Staff Officers' Course at Keesler AFB. The war game has been automated to run on a VAX/VMS computer. The program allows computer assisted play of the game using a manual gameboard.

The game has two portions, an Acquisition Phase and an Operations Phase. In the Acquisition Phase, Players budget for research and developments, manufacturing, purchase, and operations and maintenance of communications and electronic equipment for a Joint Task Force (JTF). In the Operations Phase, Players allocate the available communications and electronic equipment to units, physical locations, or special missions and then direct the employment of the units and equipment in a war game.

The programs are written in structured FORTRAN 77, with extensive comments and external documentation, so that they can be read, understood, modified, and expanded by those with limited programming experience.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: CDR G. R. Porter  
Department of  
Operations Research

INTERACTIVE GRAPHICAL SUPPORT FOR A SMALL-UNIT  
AMPHIBIOUS OPERATION COMBAT MODEL

Glenn D. Simon  
Major, United States Marine Corps  
B.A., Lamar University, 1970

The scope of this thesis is to take a first step towards making a combat model "user friendly" through interactive computer graphics. To accomplish this first step a graphical support program was developed for visual/graphical representation of a Lanchester-type force-on-force combat model that simulates a small-unit amphibious operation. The graphical support program provides the user with a menu to determine the type of visual display for output data. Three types of visual displays are considered: (1) line graph; (2) bar chart; and (3) grid map. Each type provides a different view of the model's output data. By utilizing these types of visual displays, the viewer is provided a supportive method that enables him to analyze and assimilate the model and its output data.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: J. G. Taylor  
Department of  
C3 Academic Group

A DESCRIPTION AND COMPARATIVE ANALYSIS OF TWO COMPETING  
AUTOMATED SHORAD-02 SYSTEMS

John David Welt  
Captain, United States Army  
B.S., United States Military Academy, 1974

The U.S. Army is attempting to provide air defenders with a command and control system that offers the speed and accuracy required to combat the aerial threat to the division. This thesis analyzes two competing proposals for an automated Short Range Air Defense (SHORAD) 02 system. The analysis is based on constraints and criteria developed by the Army Air Defense Center and from requirements deemed necessary by the author. It is suggested that proposals by other manufacturers undergo a similar analysis to provide the earliest possible deployment date.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: S. J. Paek  
Department of  
Operations Research

A PRELIMINARY ANALYSIS OF HUMAN FACTORS AFFECTING THE  
RECOGNITION ACCURACY OF A DISCRETE WORD  
RECOGNIZER FOR C3 SYSTEMS

Howard William Yellen  
Captain, United States Army  
B.S., Temple University, 1972

Literature pertaining to Voice Recognition abounds with information relevant to the assessment of transitory speech recognition devices. In the past, engineering requirements have dictated the path this technology followed. But, other factors do exist that influence recognition accuracy. This thesis explores the impact of Human Factors on the successful recognition of speech, principally addressing the differences or variability among users. A Threshold Technology T-600 was used for a 100 utterance vocabulary to test 44 subjects. A statistical analysis was conducted on 5 generic categories of Human Factors: Occupational, Operational, Psychological, Physiological and Personal. How the equipment is trained and the experience level of the speaker were found to be key characteristics influencing recognition accuracy. To a lesser extent computer experience, time of week, accent, vital capacity and rate or air flow, speaker cooperativeness and anxiety were found to affect overall error rates.

Master of Science in  
Systems Technology (C3)  
March 1983

Advisor: G. K. Poock  
Department of  
Operations Research



**MASTER OF SCIENCE**  
**IN**  
**SYSTEMS TECHNOLOGY**  
**ELECTRONIC WARFARE (EW)**

DESIGN AND ANALYSIS OF A GENERALIZED CLASS  
OF FIN-LINE FILTERS

Keith B. Alexander  
Captain, United States Army  
B.S., United States Military Academy, 1974  
M.S.B.A., Boston University, 1978

Steven R. Hamel  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1974

This study investigates fin-line filter structures, a type of E-plane waveguide device. Expressions germane to the analysis of fin-line structures are developed. A computer aided design and analysis program based upon a mode-matching technique is described. Filters designed by this program are fabricated and tested in X-band. Good agreement with predicted response is obtained. Filters fabricated and tested in Ku and Ka bands by other researchers are analyzed by the new program. Good agreement between predicted response and published performance is noted.

Master of Science in  
Systems Technology (EW)  
September 1983

Master of Science in  
Physics  
September 1983

Advisors: Yi-Chi Shih  
Department of  
Electrical Engineering

E. A. Milne  
Department of  
Physics

VIETNAM AND THE SOVIET UNION: IMPLICATIONS FOR  
EUROPE AND AMERICAN FOREIGN POLICY OPTIONS

Robert Nelson Boudreau  
Captain, United States Air Force  
B.S., University of Massachusetts, 1972

This thesis concludes that Soviet expenditures in Indochina, particularly Vietnam, have significantly reduced assets and options available to the USSR in Europe. Economic, military, and political expenditures are assessed. Tradeoffs between the Soviet Union's Indochina resource commitments and European limitations are established. Based on these tradeoffs, three policy options for the United States in South-East Asia are formulated -- hardline, low key, and minimal involvement. A "low key" option, with emphasis on diplomatic and economic instruments, is recommended as preferable to military means.

Master of Arts in  
National Security Affairs  
March 1983

Advisor: C. A. Buss  
Department of  
National Security Affairs

CONTENT ANALYSIS OF MORSKOY SBORNIK: 1978-1982

Jon Joseph Azzerello  
Lieutenant, United States Navy  
B.S., West Virginia University, 1970

This paper is an analysis of Morskoy Sbornik with an emphasis on history, missions and Soviet perceptions. First there is a discussion of Morskoy Sbornik's history, starting with the Czarist period and then following it through the period of the October Revolution.

Following this is an examination of Morskoy Sbornik's missions which are: first, to foster a unity of views; second, to serve as a forum for debate; and third, to disseminate useful information.

Next, Morskoy Sbornik is compared and contrasted to U.S. Naval Institute Proceedings. Differences result because Proceedings is a private organization whereas Morskoy Sbornik is an official organ of the Soviet Union, which serves the purposes of the state.

Last, the paper examines writing in Morskoy Sbornik on three topics to define Soviet viewpoints from what is published. The three topics examined are: the maritime threat; command and control in the Soviet Navy; and the commanding officer.

Master of Arts in  
National Security Affairs  
September 1983

Advisor: R. Bathurst  
Department of  
National Security Affairs

**MASTER OF ARTS**

**IN**

**NATIONAL  
SECURITY  
AFFAIRS**

THE POSSIBILITIES OF USING ORGANIZATION DEVELOPMENT  
TECHNOLOGIES IN THAI CULTURE

Peerasak Wathanaronchai  
Lieutenant, Junior Grade, Royal Thai Navy  
B.S., Royal Thai Naval Academy, 1978

The purpose of this thesis is to consider the application of organization development theories and models to the organizations in Thailand, particularly in the public sector. The physical background of the country, national economy and some characteristics of Thai people, which, from the author's perspective, have significant influence on the elements of the models and theories of organization development are described. The barriers of planned change in Thai's public sector are also described. A recommended strategy to improve the effectiveness of the organization development process and the efficiency of knowledge utilization within the country is proposed. The anticipated improvement of organization development technique is also briefly discussed.

Master of Science in  
Telecommunications Systems  
Management  
March 1983

Advisor: R. McGonigal  
Department of  
Administrative Sciences

MULTIPLE PATH STATIC ROUTING PROTOCOLS  
FOR PACKET SWITCHED NETWORKS

Harry Thornberry Schiantarelli  
Lieutenant Commander, Peruvian Navy  
B.S., Naval Telecommunications School, Peru, 1974

A central issue in the design of a packet switched communications network is the development of an efficient routing protocol, which determines the routes followed by the information as it traverses the network. The performance of a static routing protocol that allows for multiple path routing based on the use of routing fractions, is analyzed using computer simulation. Comparison is made between the performance of this protocol and that of a minimum number of hops routing protocol. Routing fractions calculated by two different methods are used and their relative performance analyzed. A comparative analysis is done of the performance of this protocol when using virtual circuit service and datagram service in the network. Provision is made to extend use of the simulation program to analyze dynamic routing cases using routing fractions.

Master of Science in  
Telecommunications Systems  
Management and  
Master of Science in  
Engineering Science  
September 1983

Advisor: John M. Wozencraft  
Department of  
Electrical Engineering

DESIGN OF AN INFORMATION SYSTEM TO SUPPORT  
PROGRAMMED TACTICAL RESPONSES

Nicolaos John Rogacos  
Commander, Greek Navy

This thesis presents the conceptual design of a knowledge-based information system to provide a tactical naval commander with rapid and timely decision support in an electronic warfare environment. The system's design is based on concepts from data-base management and artificial intelligence, and emphasis is placed on the representation and processing of information gathered by passive electronic warfare devices, data about the tactical environment, and cognitive data in the form of production rules (programmed responses). The system is designed to be a consultant to a tactical commander and to expedite responses to identified enemy threats.

Master of Science in  
Telecommunications Systems  
Management  
March 1983

Advisor: J. G. Taylor  
Department of  
Operations Research



## SPREAD SPECTRUM FREQUENCY MANAGEMENT

Robert D. Montgomery  
Captain, United States Marine Corps  
B.A., Michigan State University, 1974  
M.S., University of Southern California, 1981

Because of the nation's increasing demand for more telecommunication capacity, there is a continuing need for more efficient ways of sharing the radio spectrum. The conventional ways of allocating the spectrum are by frequency, space and time division. However, for systems using new technology this is inefficient. Hence, it is desirable to re-examine alternative procedures that might be necessary if the benefits of telecommunications are to be assured in the face of increased demand. Spread spectrum techniques, which are based on principles different than those currently used in spectrum allocation, seem to offer benefits for spectrum sharing and for some applications superior to those of frequency division. *This thesis provides a summary of the principles upon which spread spectrum systems have developed and the progress of frequency management involving spread spectrum systems. This analysis considers several strategies to accomodate spread spectrum in frequency management and its role in future spectrum sharing opportunities.*

Master of Science in  
Telecommunications Systems  
Management  
March 1983

Advisor: D. C. Boger  
Department of  
Administrative Sciences

A PLAN FOR THE ACCESS AND UTILIZATION OF THE DEFENSE DATA  
NETWORK BY THE UNITED STATES COAST GUARD

Edward A. Lane  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1976

This thesis presents a proposal for the integration of United States Coast Guard computer networks with the Defense Data Network. The hardware and software functional requirements for the merger are based upon a thorough understanding of packet switching and the layering of communications protocols. Results indicate that it is possible to form a hierarchical networking architecture by joining Coast Guard local-area and regional networks with the long-haul services of the Defense Data Network. Thus, computer users at each Coast Guard command level will be able to invoke a variety of applications ranging from the handling of traditional military message traffic to the processing of sophisticated software packages.

Master of Science in  
Telecommunications Systems  
Management  
September 1983

Advisor: N. F. Schneidewind  
Department of  
Administrative Sciences

THE IMPACT OF ELECTROMAGNETIC INTERFERENCE  
ON SURFACE SHIP ANTENNA PLACEMENT

Janice Lai  
Lieutenant, United States Navy  
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More and more electronic systems are being added to Naval ships. Many of these systems radiate or receive electromagnetic (EM) energy. They are all vital parts of a ship and it is important that each functions properly if the ship is to accomplish its assortment of missions. However, it is becoming increasingly difficult to place these systems on board a ship without their EM radiation interfering with each other. This thesis analyzes the EM design problem. It concludes that a central clearing house for electromagnetic information is needed which would maintain an up-to-date data base on electromagnetic problems and solutions, that ship-board personnel need to be more aware of the EMC problem, and suggests that more frequent updates of model studies and military standards be made.

Master of Science in  
Telecommunications Systems  
Management  
March 1983

Advisor: A. W. McMasters  
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Administrative Sciences

THE SUBSPECIALTY MANAGEMENT SYSTEM AS IT RELATES TO THE  
COMMUNICATIONS SUBSPECIALIST SURFACE WARFARE OFFICER

Grayson L. Koogle  
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B.S., Virginia Polytechnic Institute, 1975

The subspecialty management system for the Communications Subspecialist Surface Warfare Officer is the subject of this research. The written policies and instructions relating to the system are identified as to content and the effect on the subspecialist. The management system is outlined emphasizing the interfaces and responsibilities for subspecialty coding, counseling, utilization and tracking, and subspecialist selection. The records of Surface Officers currently assigned a communications code are analyzed with regard to career paths (graduate school entry point, first utilization, utilization at promotion points, trends relating to selection). The current billet structure is also studied. In general, the standard Surface Warfare Officer career path captures the pattern within the bounds of normal detailing experiences.

Master of Science in  
Telecommunications Systems  
Management  
March 1983

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NAVAL COMMUNICATIONS PROCESSING AND ROUTING SYSTEM (NAVCOMPARS):  
A MODEL FOR BROADCAST PERFORMANCE ANALYSIS

Gary L. George  
Lieutenant, United States Navy  
B.S., Georgia State University, 1975

This thesis represents an analysis of the performance of the Naval Telecommunications System's (NTS) multichannel broadcast. It highlights the speed differential between the Naval Communications Processing and Routing System's (NAVCOMPARS) processing subsystems and the multichannel broadcast's transmission lines.

In this effort, the message flow through the NAVCOMPARS is described. An analytic approach was chosen and input statistics, such as average message length and input rates, were gathered for queuing analysis. The operational characteristic upon which broadcast performance is evaluated is the average time delay in the system. The broadcast channel's ability to satisfy future communications requirements is also examined. The analysis demonstrates that, unless the increasing trends in message input rates are reversed or message lengths reduced, a dedicated broadcast overload channel would be required to meet communications requirements throughout the 1980's.

Master of Science in  
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March 1983

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EFFECT OF DEREGULATION IN THE TELECOMMUNICATIONS INDUSTRY  
ON MILITARY BASE TELEPHONE COMMUNICATIONS

Philip Raymond Flowers  
Lieutenant Commander, United States Navy  
B.A., Cardinal Glennon College, 1965

The telecommunications industry in the United States has recently been undergoing a period of rapid change. To enhance the administrative capabilities of base personnel and to obtain the most cost-effective telephone equipment and services, the military base commander must understand the events which have shaped today's telecommunications industry, appreciate the options which are becoming available, and insist that the base telephone officer practice the sound management techniques of a telecommunications manager in acquisition and management of the base telephone system.

In furtherance of these objectives, this thesis presents a brief historical survey of the industry, concentrating upon recent developments, and presents a paradigm for management, operations, and analysis of military base telephone communications.

Master of Science in  
Telecommunications Systems  
Management  
March 1983

Advisor: D. C. Boger  
Department of  
Administrative Sciences

**MASTER OF SCIENCE**

**IN**

**TELECOMMUNICATIONS**  
**SYSTEMS**  
**MANAGEMENT**

# EFFECTS OF ATMOSPHERIC REFRACTION ON U.S. GROUND WARFARE

Theodore Paul Mouras  
Captain, United States Army  
B.S., Virginia Military Institute, 1976

Charles Thomas Houser  
Lieutenant Colonel, United States Army  
B.S., University of Tampa, 1975

This thesis investigates the effects of atmospheric refraction on military ground-force tactical systems which utilize EM energy propagating through the troposphere. Anomalous propagation, mirages, and atmospheric turbulence are the three major atmospheric refractive conditions discussed. EM energy from visible light to VHF radio is considered.

The refractive characteristics of the atmosphere and the conditions that lead to significant refractive effects are reviewed. The means of predicting atmospheric refraction and the usefulness of such predictions, along with the probability of occurrence of atmospheric refraction is also discussed.

Specific examples of atmospheric refractive effects are provided in two forms: computer simulations and qualitative studies. A scenario is simulated showing the wide range of atmospheric refractive effects a typical ground force might anticipate in a desert environment. Finally, the thesis provides conclusions and recommendations for further studies.

Master of Science in  
Systems Technology (EW)  
September 1983

Advisor: G. E. Schacher  
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Physics



BALLISTIC MISSILE SUBMARINE OF THE UNITED STATES AND THE  
SOVIET UNION: A COMPARISON OF SYSTEMS AND DOCTRINE

Thom W. Ford  
Lieutenant Commander, United States Navy  
B.A., Wake Forest University, 1972

This thesis compares the development of fleet ballistic missile systems in the United States and Soviet Union and their contribution to the achievement of national security objectives of each nation. To this end, submarines and missile technologies, elements of operational practices and support, and general strategic doctrine, are traced. A comparative assessment of weapon system effectiveness and potential in achieving stated objectives is derived from capabilities, peacetime employment, and wartime plans as stated in open doctrinal documents.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: D. C. Daniel  
Department of  
National Security Affairs

THE MARITIME SECURITY OF THE BALTIC APPROACHES:  
NATO AND THE WARSAW PACT

Jan Cody Gaudio  
Lieutenant Commander, United States Navy  
B.S., State University of New York at Brockport, 1973

This research provides an analysis of the current maritime security threat to the Baltic Approaches posed by Warsaw Pact military expansion. Nordic regional security is discussed in order to determine the importance of the region from both the Warsaw Pact and NATO perspective. The role of Finnish and Swedish neutrality as well as the roles of NATO and Warsaw Pact allies are examined in terms of capability, resolve and national interests. Denmark, as the geographic key to the Baltic, is discussed in particular depth. As Soviet pressures have increased in Danish territorial waters and airspace, Denmark's support for NATO has been questioned. The contribution of the Federal Republic of Germany, militarily NATO's strongest Baltic ally, is also reviewed. The regional balance in the Baltic has moved in favor of the Soviet led Warsaw Pact. However, Soviet political and military pressure has been relatively ineffective and even counterproductive to date. Both Denmark and the FRG remain firmly entrenched in NATO. Neutral Sweden has become even more firmly committed to defend Swedish territory from Warsaw Pact encroachments. Possible options are explored to enable NATO to shift the regional balance in the direction of stable deterrence and provide renewed security to the Baltic Sea and its approaches.

Master of Arts in  
National Security Affairs  
June 1983

Advisor: D. S. Yost  
Department of  
National Security Affairs

PERSIAN GULF SECURITY: THE UNITED STATES AND OMAN, THE GULF  
COOPERATION COUNCIL, AND WESTERN ALLIED PARTICIPATION

Joseph Anthony Gawlik  
Lieutenant Commander, United States Navy  
B.S., University of Dayton, 1970

This thesis examines Persian Gulf security from a geostrategic and historical perspective. It emphasizes the current relationship between the United States and Oman and offers the opinion that this is not the best policy course for the U.S.

Secondly, the thesis proposes two alternative routes for Gulf security by examining the newly formed Gulf Cooperation Council and Western Allied contributions toward Gulf defense.

The thesis concludes with a look at the advantages and disadvantages of the various Gulf security policies and proposes a new course for U.S. policy in the region.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: R. H. Magnus  
Department of  
National Security Affairs

NEEDLES AND HAYSTACKS: THE SEARCH  
FOR ULTRA IN THE 1930's

Linda Yolande Gouaze'  
GS-13 Department of Defense  
B.A., Seton Hill College, 1965  
M.S.S.I., Defense Intelligence School, 1981

This thesis traces the efforts in the 1930's of the Polish, French, and British Intelligence Services to break the German Enigma Ciphering machine, efforts which led to the Bletchley Park Ultra operations of World War II.

The cooperation, and lack thereof, among the Intelligence Services is discussed, with the conclusion that more cooperation sooner would have better served the individual national interests of each.

Master of Arts in  
National Security Affairs  
March 1983

Advisor: S. Jurika, Jr.  
Department of  
National Security Affairs

## INDOCHINA: THE FEDERATION FACTOR

David C. Harrison  
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B.S., United States Naval Academy, 1976

Removed from its historical setting, the concept of "Indochinese Federation" has assumed an unintended connotation. Ambiguity and incomplete documentation surrounding the origins of the concept compounds this dilemma. Consequently, the usage of "Indochinese Federation" to explain recent developments in Southeast Asia infers biases which merit careful consideration. When these deficiencies of context and ambiguity are ignored, the consequence emerges that Vietnamese actions in Indochina are potentially being interpreted within a limited spectrum of possible Vietnamese intentions. This analysis proceeds along two planes; it examines the historical trend toward regional integration in Indochina, and it examines the specific concept of an Indochinese Federation. While a trend toward greater regional associations has been observed - both historically and during the recent past - this trend does not necessarily spell federation.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: C. A. Buss  
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National Security Affairs

## SSBN SURVIVABILITY: A TIME FOR CONFIDENCE-BUILDING MEASURES?

James A. Hayes  
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B.A., Northwestern University, 1971

Historical and technological imperatives have led both the United States and the Soviet Union to array their strategic nuclear forces in triads of air, land, and sea launched ballistic missiles. This thesis will focus on the sea-based legs of the American and Soviet triads, examining a series of confidence-building measures (CBMs) that may be considered during the Strategic Arms Reduction Talks (START) that are underway in Geneva. Some proponents have argued that these CBMs, if implemented, would strengthen each side's belief in the invulnerability of nuclearpowered, ballistic missile launching submarines (SSBNs), thereby increasing strategic stability. These proposals seek to increase confidence in SSBN survivability by managing both the employment of anti-submarine warfare (ASW) forces and the development of technology that could be specifically directed against SSBNs. This thesis will consider the possible effects that five different CBMs could have on U.S. perceptions of SSBN survivability. These changes in perception will be measured against the costs that might be exacted in other areas (e.g., tactical anti-submarine warfare) by agreeing to the CBMs.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: D. C. Daniel  
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National Security Affairs

GOVERNMENT CAN MOUNT EFFECTIVE COUNTER-INSURGENCY PROGRAMS  
AGAINST MARXIST ORIENTED REVOLUTIONS

Robert Arthur Hendricks  
Lieutenant, United States Navy  
B.S., Tennessee Technological University, 1975

Governments can effectively combat Marxist oriented revolutionary movements. The facade of legitimacy emerges as the most important variable in conducting a counter-insurgency campaign. Highly developed organizational structure supported by viable lines of transportation and communication enhance both the legitimacy of a government and also its capability to deter internal aggression by opposition forces.

Master of Arts in  
National Security Affairs  
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Department of  
National Security Affairs

# LONG RANGE STRATEGIC PLANNING: AN APPLIED MODEL

Charles William Kennard, Jr.  
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B.S., United States Naval Academy, 1975

This thesis addresses the issue of long range strategic planning. The model developed in Chapter One is meant to be a conceptual framework around which the complex issues of U.S. foreign policy can be organized. Chapters Two through Five apply this model to U.S./South African relations. Chapter Six is a case study of South African Nuclear Capabilities.

Master of Arts in  
National Security Affairs  
June 1983

Advisor: M. W. Clough  
Department of  
National Security Affairs



UNITED STATES NATIONAL SECURITY INTERESTS  
AND THE REPUBLIC OF MEXICO

*Eric Efrain Matos*  
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The implications of the term "national interest" have recently been under debate among those involved in foreign policy decision making. The word "interest" derives from the Latin meaning "it concerns, it makes a difference to, it is important with reference to some person or thing."

The difficulties and complexity of defining the national interest has caused many analyst of the foreign policy process to turn away from the concept altogether in spite of the fact that the term remains a part of the rhetoric of foreign policy. The basic premise here is that foreign policy should be concerned with the ability to achieve the national interest rather than with any strict definition of a complex concept.

The thesis of this study is that although United States-Mexican relations have been founded on historical ties and the sharing of a 2,000 mile border, the long-term development of the relationship will depend on the U.S. acceptance of Mexico as not just another country, but as a neighbor whose interests and problems must be recognized and dealt with within the scope of mutual interests and in pursuit of U.S. national interests.

Master of Arts in  
National Security Affairs  
June 1983

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National Security Affairs

A RACE FOR MARTYRDOM: THE ISLAMIC REVOLUTIONARY  
GUARDS CORPS (IRGC)

Susan E. Merdinger  
Lieutenant Commander, United States Navy  
B.A., University of Maryland, 1972

The Iranian Revolutionary Guards Corps (IRGC) is often referred to in Western press but still, little is known about these uniformed zealots. This thesis is an attempt to show that the IRGC is not a haphazard army but one that is striving to organize while, at the same time, attempting to deal with Iran's internal security, as well as external threats.

Ayatollah Khomeini's death is certain to bring about the eruption of further violence in Iran. The importance of the revolutionary guards should not be underestimated in the ensuing power struggle, since the Corps may eventually provide future leadership for Iran.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: J. W. Amos  
Department of  
National Security Affairs

## A CORPS OF NAVAL STRATEGISTS

Charles E. Mislsted, Jr.  
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B.A., Florida Technological University, 1971

This thesis examines the necessity and the feasibility of the establishment of a corps of Naval strategists. The research centered on determining the applicability of advantages of the German General Staff concept to the Navy Planning Systems, without suffering the disadvantages of the concept. Also analyzed in this report is the feasibility of instituting procedures currently found on the British, French and Israeli defense planning establishments as well as from American corporate business strategic planning. A proposal is offered that would establish a network of specifically educated and trained naval strategists that would be responsible for long-range planning in the U.S. Navy. The plan includes a proposed training, education, career pattern and assignment flow for the network is to improve the effectiveness of Navy long-range planning through enhanced efficiency, consistency and continuity.

Master of Arts in  
National Security Affairs  
June 1983

Advisor: F. M. Teti  
Department of  
National Security Affairs

THE EFFECT OF U.S. NATIONAL INTERESTS ON ARMS  
TRANSFER DECISION MAKING IN BRAZIL

Jane Dalla Mura  
Lieutenant, United States Navy  
B.A., Montclair State College, 1971

This thesis examines the affect of United States national interests on foreign policy toward Latin America. Specifically, it concerns the decisions to transfer or deny arms to Brazil and the influence the human rights policy had on those decisions. Various theories on the concept of the national interest are provided, as are citations of both U.S. and Latin American Policy makers on their respective countries' interests. Conditions conducive to arms transfer are described for both the United States as supplier and Latin America/Brazil as recipients. The status of Brazil's own arms industry is described to exemplify its self-determination as affected by the desire to break away from what they perceive to be a paternalistic United States. The thesis concludes that the arms transfer relationship between Brazil and the United States is significantly influenced by U.S. national interests.

Master of Arts in  
National Security Affairs  
September 1983

Advisor: F. M. Teti  
Department of  
National Security Affairs

## PROSPECTS FOR NUCLEAR PROLIFERATION

Donald Wayne Phillips  
Lieutenant Commander, United States Navy  
M.A., Naval Postgraduate School, 1983

This study attempts to survey and analyze the various problems relating to the proliferation of nuclear weapons and the future of the nonproliferation regime. Nuclear proliferation is the intersection of a number of important issues, none of which individually will decide how events will unfold.

The growing number of nuclear power industries throughout the world has led to the widespread availability of the necessary nuclear technology and fissile material used to construct nuclear weapons. Therefore, the capability is increasingly becoming available to many national leaders.

Second, the motivations for a country to "go nuclear" could change rather suddenly in an international system which is plagued by a greater fragmentation and diffusion of power.

This study finds that the present fragile nuclear nonproliferation regime is inadequate to limit the spread of nuclear weapons, thus the world is gradually moving into a period in which it may soon contain from 15 to 20 nuclear states. And the danger will be all the greater that a brush-fire war involving any one of them may take on global dimensions.

Master of Arts in  
National Security Affairs  
June 1983

Advisor: M. Clough  
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National Security Affairs

## OIL AND ITS INFLUENCE ON STRATEGIC PLANNING

Terry C. Pierce  
Lieutenant, United States Navy  
B.A., Washington State University, 1974

This paper analyzes the continuing threat of a serious oil supply disruption and readiness of the U.S. to cope with such a development. Chapter One examines current perceptions of the likelihood of another oil crisis. It argues that these perceptions are critically flawed by an inadequate conceptual understanding of the nature of vulnerability. Chapter Two traces the U.S. response to the 1973-74 and 1978-79 oil crises and surveys the prospects for a future oil crisis. Chapter Three evaluates the present oil glut in relation to the U.S. long term programs to reduce oil vulnerability. It examines the effect that a new complacent attitude arising from the appearance of surplus may have on efforts to promote policies to avert a future crisis. Chapter Four examines the different contingencies that the U.S. could possibly face as a result of oil dependence. Chapter Five examines U.S. national goals and the linkage between goals and policy. Chapter Six proposes a strategy of attainment to reduce U.S. vulnerability to future oil disruptions. Such a strategy would address both the short and long term problems that face American strategic planners concerned with the oil issue. Specifically, this strategy of attainment will evaluate the physical and political constraints involved in implementing the plan and will address the free market approach to energy security and the real possibility of exploiting shale oil reserves to meet U.S. national interest. Chapter Seven concludes that the present oil glut is not a long term phenomenon and immediate implementation of this strategic plan is necessary in order to mitigate the effects of an oil interruption.

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Advisor: M. W. Clough  
Department of  
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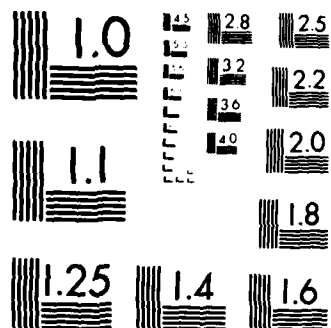
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SPAIN AND MOROCCO: THE SPANISH ENCLAVES IN NORTH AFRICA,  
POTENTIAL MEDITERRANEAN SECURITY DILEMMA

Richard H. Porritt, Jr.  
Lieutenant Commander, United States Navy  
B.A., Hartwick College, 1970

Two Western Mediterranean/North African issues which receive a great deal of attention are the Gibraltar question between Spain and Britain, and the Western Sahara Question between Morocco and the Sahrawi Arab Democratic Republic (SADR). With a significant change in either one of these issues, a more obscure regional issue is likely to surface and gain more publicity--the status of Spain's enclaves in North Africa. A settlement in the Sahara would allow Morocco to redirect its efforts to the Strait of Gibraltar area. Furthermore, King Hassan II of Morocco has said that a change in the status of Gibraltar will presage a change in the status of the Spanish enclaves. Spain's military has historically had a large stake in the enclaves, however, Spain's Socialist vowed even before the 1982 elections to keep the enclaves Spanish.

What is the nature of these Spanish enclaves today? Why do they continue to exist? What is their historical origin? What is the status of relations between Spain and Morocco? What are the superpower stakes in the region? How does one systematically look at enclave situations and similar territorial disputes in the 1980s, and in the recent past? Answers to these questions present the focus of this study.

Master of Arts in  
National Security Affairs  
December 1982

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## STRATEGY: A PHILOSOPHY OF DOCTRINE

Gerard David Roncolato  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1978

This thesis presupposes that America is in a time of increasing danger as its relative power in the world declines. The paper, in addressing this situation, defines strategy as a method of thought. It distinguishes between the more conceptual strategy and the product of planning, doctrine. Such a distinction allows the formulation of a general concept of strategy which remains constant and continuous over time. This in turn provides the solid foundation necessary for flexible and timely planning in a time of unprecedented change.

The paper contains four recommendations: 1) To increase the historical and philosophical training of military officers, and to emphasize the study of the art of war; 2) To train and assign a dedicated group of strategic planners who rotate between field and staff, but whose principle job is planning; 3) To centralize the chain of command in the Department of Defense; and 4) To decentralize authority in the Department of Defense to the greatest extent feasible.

Master of Arts in  
National Security Affairs  
June 1983

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National Security Affairs

THE SOVIET NAVAL INDIAN OCEAN SQUADRON  
RAISON D'ENTRE: ACTION OR REACTION?

Allen M. Stout  
Lieutenant, United States Navy  
B.S., University of Illinois, 1977

The Soviet Naval Indian Ocean Squadron began its active deployment to the Indian Ocean in 1968. This led to a wide-ranging debate as to its purpose, which could be active or reactive in nature. To deal properly with the Squadron, it is important for the planner to understand the difference between the two.

This thesis examines the broad range of theorized missions for the Squadron. These Western theories are compared to determine the relative merits of each. A very select number of Soviet writers' works are examined for any correlation with the Western theories. This is set against the background of a historical survey of U.S. and Soviet naval relations in the region. The results of these comparisons lead to the conclusion that the Squadron's mission is both active and reactive, and that most of the theories have some merit.

Master of Arts in  
National Security Affairs  
September 1983

Advisor: M. Clough  
Department of  
National Security Affairs

THE NAVIES OF THE FEDERAL REPUBLIC OF GERMANY AND THE GERMAN DEMOCRATIC  
REPUBLIC: A COMPARISON AND ANALYSIS OF STRUCTURES,  
ALLIANCE RELATIONS, DOCTRINE, AND CAPABILITIES

John M. Tindall  
Lieutenant, United States Navy  
B.A., University of Wisconsin-Parkside, 1973

Since 1967, when NATO adopted "flexible response" as the alliance strategy, reliance upon the conventional leg of the NATO triad has increased, including reliance upon the West German Navy. The West German Navy's principal mission is to implement the alliance's strategy of "forward defense" in the Baltic. During the same period of time, the non-Soviet Warsaw Pact naval forces in the Baltic, including the East German Navy, have also been strengthened.

Thus, two well-equipped German navies of differing ideological and social systems face one another. This thesis which is not meant to be comprehensive, surveys the following topics in relation to both navies: German maritime traditions; origins of the present German navies; organizational structure and relationships to alliances; doctrine, strategy and missions; and capabilities.

Master of Arts in  
National Security Affairs  
June 1983

Advisor: D. S. Yost  
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National Security Affairs

## WEST AFRICAN OIL: WILL IT MAKE A DIFFERENCE?

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B.M.E., Oklahoma State University, 1968  
M.S., Abilene Christian University, 1979

This thesis analyzes the commercial development of West Africa's petroleum resources and examines the implications of sudden "oil wealth" for the region's political and economic development. Section one outlines the evolution of the petroleum industry and surveys the hydrocarbon potential of twenty nations along the coast from Senegal to Angola, and inland from Mali to the Central African Republic. An evaluation of the physical and political constraints on the development of the region's petroleum resources and an aggregate analysis of the area's potential for new oil reserves and production capacity are also presented. Finally, by drawing from the experiences of established oil producers like Nigeria, the economic and political implications of the widespread development of petroleum resources in West Africa are projected at the domestic and regional levels. Specifically, will newfound oil wealth help resolve existing problems, or will it magnify them? The study concludes that for most of these countries, oil wealth will be a mixed blessing.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: M. W. Clough  
Department of  
National Security Affairs

## A FRAMEWORK FOR ANALYZING AND PREDICTING INSURGENCY

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B.A., Lake Forest College, 1967

This study develops a method to analyze and predict rural insurgencies in the third world. First it derives a causal model and a process model of insurgency from social science theories and empirical studies. The models help to identify and organize twenty-eight analytical factors describing the society, physical environment, government, and the insurgents. The factors calculate the government-insurgent balance in organization, legitimacy, and coercion. An analyst using the methodology evaluates each factor that is relevant to the current phase of the insurgency and records his responses on a factor scale. The scales are isomorphic, extending from conditions of government to insurgent advantage, and are arranged in parallel on a worksheet. Connecting the selected points produces a graph that suggests the status of the insurgency. The analyst may overlay different worksheets to determine change over time or to compare insurgent situations.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: M. Clough  
Department of  
National Security Affairs

ENERGY RESOURCES OF EAST ASIAN SIBERIA: JAPAN  
AND THE U.S.S.R. AT THE CROSSROADS

Wilbur Grant Wright  
Lieutenant Commander, United States Navy  
B.S., University of New Mexico, 1971

East Asian Siberia (EAS) is a storehouse of various resources, particularly those required for energy production. This vast area which captivates the imagination when "Siberia" is mentioned is almost exclusively unknown to the outside world. In this thesis I will present the physical reality of this harsh yet rich land and examine the governmental processes and moods inside Japan and the USSR as well as their joint interaction for development and benefit of this area. The hypothesis I have tried to develop is that the energy resources of East Asian Siberia are available for exploitation if Japan and the USSR work closely to develop them. Their forced cooperation puts them at the crossroads; the routes they take will determine future relations and resource availability for both countries.

Master of Arts in  
National Security Affairs  
December 1982

Advisor: E. A. Olsen  
Department of  
National Security Affairs

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